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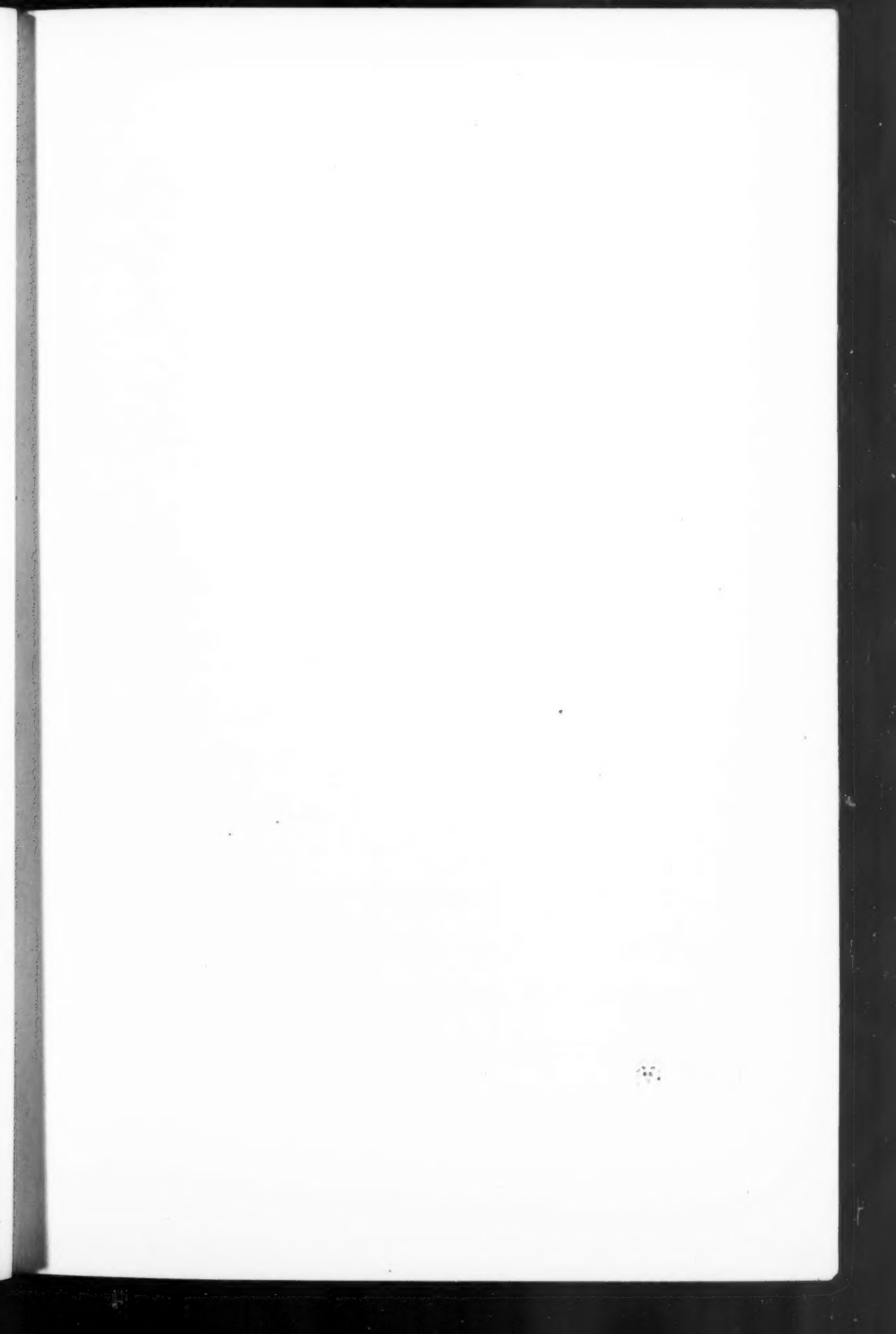
THE AMERICAN MUSEUM OF NATURAL HISTORY was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people, and it is in cordial coöperation with all similar institutions throughout the world. The Museum authorities are dependent upon private subscriptions and the dues from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world.

The membership fees are,

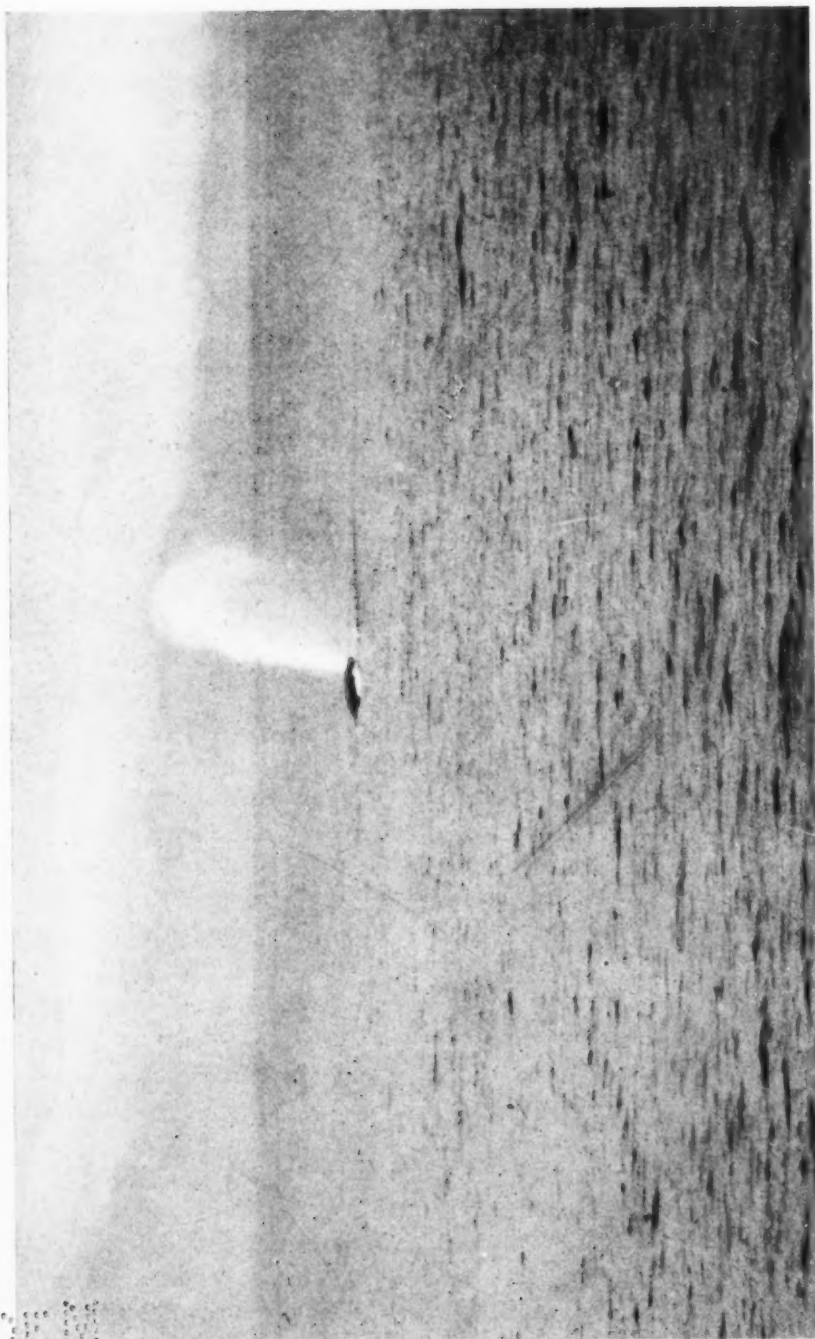
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The Museum is open free to the public on every day in the year.



U. S. N. M.



THE "SPOUT" OF A FINBACK WHALE. AUGUST 20, 1908.
Photographed from a distance of about one hundred yards.

The American Museum Journal

VOL. IX

FEBRUARY, 1909

No. 2

A SUMMER WITH THE PACIFIC COAST WHALERS.

THE recent establishment of several shore-whaling stations on the coasts of Vancouver Island and Alaska, has made possible a study of certain species of the large whales inhabiting the North Pacific Ocean. With the exception of a single work, "Marine Mammalia," written by Captain C. M. Scammon in 1874, these animals have remained almost unknown scientifically, and their relationship to the corresponding Atlantic forms, which have been carefully investigated by Dr. F. W. True, has never been satisfactorily determined. To secure data for a comparative study of the external and osteological characters of these whales, I left New York late in April on a Museum expedition to the west coast whaling stations.

The species commonly taken there are the Humpback, Sulphur-bottom and Finback, the first-named in largest numbers. All belong to the group known as Finwhales, having short, coarse baleen or "whalebone" and thin blubber. Before the invention of the harpoon gun in 1864, they were seldom hunted, because the comparatively small yield of oil and whalebone and the great speed of the animals in the water, together with their tendency to sink when killed, rendered them *persona non grata* to the men in the small boat. To-day, however, they are being taken at a rate which threatens their speedy extinction.

The study of whales is beset with many and unusual difficulties. Their great size, alone, is a serious obstacle. If one wishes to do such an ordinary thing as to turn over a fin for observation of the color or markings of the other side, he must have the assistance of not only one man but several. Thus the naturalist is totally dependent for the success of his studies upon the men about him, in fact, they make or ruin his work by their attitude toward it.

Fortunately, I met with most courteous treatment from the owners of the stations, and my thanks are due to the Pacific Whaling Company and Dr. Rismuller of Victoria, B. C., and to Captain I. N. Hibbard of

the Tyee Company, Alaska; also to the managers of the several factories, Messrs. J. Quinton, S. C. Ruck and V. H. Street. These gentlemen, by their generous coöperation in extending the courtesies of their stations and vessels, rendered my stay pleasant as well as profitable.

The months of May and June were spent on the west coast of Vancouver Island, at Sechart, an old Indian village site on Barclay Sound. Although the weather was bad, Humpback whales were plentiful, and whenever a fair day broke the monotony of rain and fog, the following morning we were sure to find four or five Humpbacks floating breast-up at the end of the wharf. On such a day there was need for rapid work. Little could be done until the whales were drawn out of the water upon the "slip," as the long inclined platform is called; then photographs, detailed measurements and descriptions had to be secured before the animal was denuded of its blubber covering. The ease and quickness with which a large whale weighing, perhaps sixty or seventy tons, can be handled by means of the steam winch is almost incredible; within fifteen or twenty minutes from the time the animal is taken from the water, little remains of the blubber on the upper side. In order to determine the extent of individual variation in color and external characters, each specimen was carefully described, a "standard" set of measurements taken, and as much additional matter recorded as time and circumstances permitted. While the flesh was being stripped from the bones, there was opportunity for study of the fresh skeleton, and it was possible to obtain many facts relating to variations in the vertebral column, pectoral limb, ribs and other parts. Later many of the bones were measured and photographed. Thirty Humpbacks in all were examined at Sechart, and the skeleton of an exceptionally fine specimen, including its complete set of baleen, was secured.

At the end of June, I proceeded one hundred miles up the coast to the station located in Kyuquot Sound, where Humpbacks, Sulphurbottoms and an occasional Finback were being taken. The weather conditons of the month of July were good, and the facilities for study enjoyed through the kindness of Mr. S. C. Ruck, manager of the station, were exceptional. As the result of one day's hunting, the steamer towed to the wharf two large Sulphurbottoms, one Finback and three Humpbacks, a record catch which raised the total number to twenty-six whales for the week.

At Kyuquot an opportunity offered for work upon a large Sperm



A HUMPBACK WHALE EMERGING FROM BENEATH THE STEAMER.
The blowholes or nostrils are open, since the animal is drawing in its breath.



THE TAIL OF A DIVING HUMPBACK.

1904



THE WHALE HARPOON GUN, READY TO FIRE.



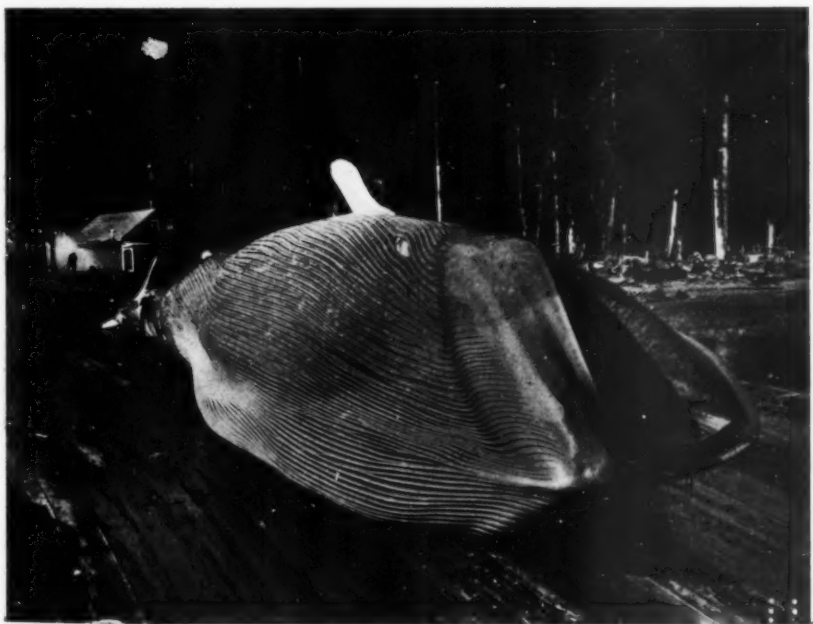
THE GUN HARPOON IN THE AIR.

Showing, besides harpoon and rope, the smoke and sparks of the discharge, bits of burning wadding and the back of the whale.

1701



AN EIGHTY-FOOT SULPHURBOTTOM WHALE ON THE SLIP.
The animal is being drawn out of the water by means of a cable attached to its tail.



BREAST VIEW OF A LARGE SULPHURBOTTOM WHALE.

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whale. Sperms are but rarely taken at these shore stations, and I was delighted at the unexpected good fortune. The whale was drawn upon the slip early in the morning, and ample time was given to secure a complete set of photographs and measurements, with a full description of the animal as a basis for a life-sized model to be prepared at the Museum.

The Sperm whale is a strange-looking creature, the great square-ended head having a size out of all proportion to the body and giving the animal a peculiarly shapeless appearance. The whole upper third of the head is devoted to an "oil-tank" containing the valuable spermaceti, which lies in a liquid state and may be dipped out after an opening has been made. Fifteen barrels of pure spermaceti were obtained from the oil-tank in the head of this individual, and twenty-five barrels more were secured from the fat surrounding the head. The total amount of oil, including the spermaceti and that obtained from the meat, bone and blubber, was ninety barrels.

Finbacks were taken at such infrequent intervals at Vancouver Island, that I decided to go to the station at Tyee, Admiralty Island, Alaska, where this species was said to be plentiful. Arriving there early in August, I found that the reports had not been exaggerated, for Finbacks were being brought in every day. I remained at Tyee about three weeks collecting a considerable amount of valuable data, and receiving the most hospitable treatment.

At each of the stations, some time was spent on board the whaling vessels, studying and photographing the animals in the water. Few students of the Cetacea have made attempts to record their observations with the camera. The discomforts of such work are many, and one must be constantly on the alert. Nevertheless, the study is most interesting, for the momentary glimpses of phases of whale-life obtained while the animals are above the water give fascinating hints of what may take place below the surface.

The whaling steamers which hunt from the shore stations are small steel vessels, having a maximum speed of ten or twelve knots per hour. Mounted on the bow, they carry a heavy cannon which shoots a harpoon having an explosive head or point called the "bomb." When the man stationed in the "barrel" at the masthead sights a whale, the vessel is sent at full speed in pursuit, and stopped on the smooth patch of water called the "slick" which invariably follows the whale's dive. Then begins a period of waiting until the animal re-appears. If the place has

been well judged, the whale may come to the surface almost under the vessel's bow. As the animal bursts into view, sending the spout high into the air, the captain swings the gun about, sights along the barrel and fires just as the dorsal fin appears above the water. At times the whale may rise actually under the boat. This happened on one of my trips, allowing me to secure a picture of considerable interest, showing the nostrils or blowholes widely distended during the act of inspiration.

When the whales were too far away for good photographs, I watched their movements with field glasses from the bridge or the "barrel" at the mast-head. From the latter position on several occasions, I saw the act of feeding. The animals eat a small crustacean (a shrimp) about three quarters of an inch in length, which at times floats at the surface of the ocean. When the whale has taken in a mouthful of water containing quantities of these minute animals, it turns on its side, letting the immense under jaw close over the upper, while the water spurts out in streams between the plates of whalebone. The fin and one lobe of the flukes are thrust into the air and even the full length of the body is sometimes exposed, as the animal rolls from side to side.

I was fortunate in securing a photograph of a large Finback whale while it was feeding, and of a Humpback which threw itself entirely out of the water. Other pictures show both species in the acts of spouting and diving. Thus many interesting observations on the habits and "home life" of these strange animals were given indisputable record by the aid of the camera.

ROY C. ANDREWS.

A PORTION of the central Hall (No. 204) of the second floor of the Museum has been fitted up expressly for children, through the generosity of subscribers to a special fund. Among the features of the Children's Room are live animals in aquaria and growing plants, as well as books, pictures and specimens which may be handled by the juvenile visitors. The room is under the direct care of Mrs. Agnes L. Roessler.

THE attendance at the Museum during 1908 was 1,043,562, the record attendance for one day being 63,256, on December 27, 1908. The International Tuberculosis Exhibition was visited by 753,954 persons from November 30, 1908, to January 17, 1909.





ST. PIERRE, MARTINIQUE. VIEW NORTHWARD FROM HOTEL WINDOW.
Rue Victor Hugo, the main street of the city, which has been cleared of volcanic ash and other débris. In the background is Mt. Pelé. May, 1908.



ST. PIERRE, MARTINIQUE. SOUTHERN PART OF THE CITY.
View looking northward from the road to Le Carbet showing growth of vegetation over the city. Mt. Pelé in the background. May, 1908.

ST. PIERRE AND MT. PELÉ IN 1908.

READERS of the AMERICAN MUSEUM JOURNAL will remember that the Museum sent an expedition to Martinique and St. Vincent in 1902, directly after the beginning of the series of eruptions that made that year famous in the annals of vulcanology. The following year the Museum sent a second expedition to observe the changes that had taken place in the two volcanoes, particularly those at Mt. Pelé, Martinique, through the extrusion of the great "spine" that surmounted its eruption cone for nearly a year. Five years passed; the spine fell to pieces, entirely altering the form of the summit cone of Mt. Pelé; eruptions of débris entirely ceased in July, 1905, at Pelé, while there had been none at the Soufrière of St. Vincent after March, 1903; vegetation was asserting its sway over the devastated areas, and human occupation was advancing again toward the craters; hence it was determined to send a third expedition to the region to bring observations on the volcanoes up to date.

Leaving New York April 16, 1908, on the steamship "Guiana" of the Quebec Line, this time accompanied by my wife, I reached Fort de France, the capital of Martinique, Sunday, ten days later. Two days after this we took the ancient little coasting steamer "Diamant" for Le Carbet, an important town on the leeward coast about two miles south of the ruined city of St. Pierre. Le Carbet occupies the site of the most important settlement of the aboriginal Carib inhabitants of the island, and a shrine and cross within its borders mark the spot where Christopher Columbus is supposed to have first set foot upon Martinique in June, 1502.

From Le Carbet, we made the remainder of the journey by canoe, arriving at St. Pierre by ten o'clock with our various belongings and settling at the little "hotel" which has been built on the Rue Victor Hugo, the main street of old St. Pierre. This "hotel" boasts two guest rooms and a dining room of diminutive size, and harbors a store where malodorous salt cod fish and other viands are sold to passers-by; nevertheless, one can stay several days very comfortably at the little hostelry, and it makes convenient headquarters for excursions.

The ruins of St. Pierre look like those of a place destroyed a century ago, rather than only a few years since. Many walls that were standing on the occasion of my second visit, in the spring of 1903, have fallen,

and many streets and buildings that were plainly distinguishable then are now completely obliterated as to surface indications. Earth has been washed down abundantly from the denuded surrounding bluffs and hill slopes, bringing grass and other seeds with it, and the whole city, except for a few clearings, is covered with vegetation. The knotty bunch grass characteristic of the Lesser Antilles is flourishing luxuriantly, together with the castor-oil plant (*Ricinus communis*) and many bushes strange to northern eyes. Here and there a mango or other tree that lived through the terrible eruption blasts and the consequent burning of the city is struggling to recover from its injuries and gives a little grateful shade to the stray wanderer amid the ruins and to the cattle that are being pastured where once stood the cathedral, the hospital, the theatre, the government buildings and the stores and residences of a wealthy city.

The Rue Victor Hugo has been cleared of ash and débris for its entire length from south to north; so too have been the streets connecting this old artery of travel with the road to Morne d'Orange and the southeast, with that to Fond St. Denis and thence to Fort de France and with the route to Morne Rouge and the rich sugar and other estates of the northeastern parts of the island. The clearing of these streets was made necessary to meet the requirements of the great agricultural district that was naturally tributary to St. Pierre and that now must ship out its sugar, rum and other produce by the old route. To accommodate this traffic and the travel between the region and Fort de France, a pier has been built at Place Bertin near the hotel, and regular semi-weekly steamboat service with Fort de France began in June. The Rue de l'Hôpital also has been cleared, giving access to the headquarters of the police, established in the massive ruins of the old bank building, and the Rue Victor Hugo has been cleared southward to give unobstructed connection with the road to Le Carbet and beyond.

On May 1, we embarked in a canoe for the mouth of the Rivière Blanche to camp in its gorge, down which came the first as well as all the rest of the long series of incandescent dust-laden steam-clouds that burst from the great crater and cone for more than three years. Establishing camp on a little sand plain about two miles from the coast and twelve hundred feet above the sea, I turned my attention first to the neighboring fumaroles or steam vents that extended in an irregular line a quarter of a mile or more toward the crater. The vents nearest the crater registered a temperature of 581 degrees Fahrenheit, while 50



ST. PIERRE, MARTINIQUE. GENERAL VIEW OF RUINS. MAY, 1908.

Looking south-southwest. The prominent ruin in the foreground is part of the military hospital.



ST. PIERRE, MARTINIQUE. RUE VICTOR HUGO, LOOKING SOUTHWARD. MAY, 1908.

M70U



ST. PIERRE, MARTINIQUE. RUINS OF THE THEATRE. MAY, 1908.



MT. PELÉ, MARTINIQUE. THE WEST SIDE OF THE VOLCANO IN MAY, 1908.
The line of knolls in the middle ground is the fumarole area of the Rivière
Claire. The camp site is about 1200 feet above the sea.

yards from our tents were fumaroles that were just right for use in cooking and we employed one for the purpose. Our camp was a "dry" one, since we were four or five miles from the nearest source of fresh water.

The western and southwestern sides of the mountain present a scene of utter desolation. The sloping plain formed by the débris-filled gorge of the Rivière Blanche is thickly strewn with boulders and angular rock-fragments of all sizes, with here and there a little patch of sand; but not a sign of life, not even a blade of grass or so much as an ant, is visible anywhere. The surrounding hillsides were scored so often and so deeply by terrific blasts from the crater that they too are barren of vegetation. As one goes away, however, from this zone of greatest activity, moss, grass and other vegetation gradually appear in protected and otherwise favorable spots, while upon the other sides of the mountain where the scoring did not take place the slopes are green to the very summit, and large vegetation is rapidly making its way back into the devastated area.

Five days was enough for my work on the southwest side of the mountain, and then we moved camp to the basin of the Lac des Palmistes, the old summit plateau of Mt. Pelé, about 4,000 feet above the sea. Here, in the midst of clouds and buffeted by the heavy trade winds, we set up our tents for another stay of five days, with the idea of being able to improve every moment while the summit might be free from clouds, for the top of Mt. Pelé is densely veiled more than nine-tenths of the time. The recent eruption of the volcano was remarkable partly through the formation in the old crater of a vast new cone of solid rock (not débris) surmounted by a wonderful needle, or spine. The new feature was formed by lava which welled up through the vent, but which was in such a viscous condition that it solidified as it came and therefore rose into the air instead of running down hill. Minor explosions blew away the southwest and northwest quarters of the top of this cone leaving the great spine as a residue. At its maximum development in May, 1903, the point of this spine was 5304 feet above the level of the sea.

The mass, however, was brittle and was rifted in every direction through strains due to contraction. It could not maintain its position and therefore fell to pieces. One may see the great fragments, fifty to sixty feet across, now lying at the base of the new cone in the spiral valley between it and the wall of the old crater. Nearly 900 feet of the mountain top thus fell away, and the present summit is 4,444 feet

above sea level, or only sixteen feet higher than the old Morne Lacroix that once formed the highest part of the mountain, but which was largely destroyed by the eruption.

It is not a difficult matter now to climb the north side of the new cone, but its slope is 37 to 40 degrees from the horizontal, so that the rock fragments composing it are so loose that a slight jar starts them down hill, rendering foothold uncertain and the advance of a party dangerous to the lower members of it. In the top of the new cone, there are great fissures within which the temperature is high. In a branch of one of them my electric pyrometer gave a reading of 515 degrees Celsius, or 959 degrees Fahrenheit. After a shower, steam issues abundantly from the numerous fumaroles of the cone, but between times there is said to be no cloud of vapor, and as far as known no ash has been thrown out since the summer of 1905. The activity of the volcano has been gradually though intermittently decreasing since the great outburst of August 30, 1902, which was the most severe of the whole series, and there seems to be no present indication of another eruption.

EDMUND OTIS HOVEY.

THE INDIANS OF CALIFORNIA.

THE Department of Anthropology has arranged a new exhibit in the series illustrating the chief culture types of North America. The present exhibit, that of the Indians of California, makes the third of the series now in place, the other two, those of the Eskimo and the Indians of the Plains, respectively, having been previously opened to the public. The new exhibit is to be found in the West Hall of North American Types (No. 102 of the Ground Floor).

While the Indians of California are somewhat uniform in their habits and customs, they may nevertheless be divided into three groups: (1) Those of central California, characteristic of the type and represented in this exhibit by the Maidu. (2) Several tribes in northern California, represented in the exhibit by the Yurok. These, while having most of the characteristics peculiar to the Indians of California, have also customs and habits borrowed from Indian tribes farther north. For instance, the Yurok and several other northern tribes lived in rectangular houses with gable roofs, a style borrowed from the houses of Oregon and Washington. (3) Tribes in the southern part of California, represented



MT. PELÉ, MARTINIQUE. SUMMIT OF NEW CONE LOOKING S. 60° W.
The camp is on the site of the Lac des Palmistes, about 4,000 feet above tide. The remains of Morne Lacroix are seen at the right just above the tent. May, 1908.



MT. PELÉ. THE SPINE OR OBELISK IN MARCH, 1903.
From practically the same spot as the picture above. The spine rose 5,304 feet above the sea, or 860 feet higher than the top of the present cone.

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in this exhibit by the Mission Indians. These took over many practices from the Pueblo and other Indians of the southwestern United States, the making of pottery, an art that was unknown among other Californian Indians, being an example of this.

While the above division can be made, we must understand that the distinctions are not absolute; in fact, the inter-relations of the three main culture types are shown by the existence of mixed types. The Shasta, represented in this exhibit, stand perhaps midway between the central and northern Californian types, emphasizing the fact that after all no hard and fast classification is possible where tribes occupy adjacent geographical areas.

One of the most characteristic features of Californian Indian life is the dependence upon vegetable food, the acorn in particular. Almost every people, whatever the degree of culture, has some food article which takes the place of bread and which is in reality the "staff of life." In California, a kind of bread is made of acorn meal. The various stages of this acorn industry are illustrated by a series of small models to show the gathering of the acorn, its grinding, its leaching by means of hot water, and its drying. In the northern part of California, where salmon are found, fishing is an important industry. A case is being fitted up to illustrate the native methods of catching and treating this fish.

From the artistic point of view, one of the most prominent facts concerning these Californian Indians is their skill in the manufacture of baskets. While basketry is fairly well represented in the present exhibit, it has been given special treatment in the hall above this, on the second floor of the Museum, where will be found a collection of baskets from several parts of California as well as from other regions in North America.

DR. HENRY E. CRAMPTON has been appointed Curator of the Department of Invertebrate Zoölogy in the Museum to fill the place made vacant by the resignation of Dr. William Morton Wheeler. Dr. Crampton has published extensively and is now making researches in experimental biology, under a grant provided by the Carnegie Institution. He will retain an official connection with Columbia University, where he has served as lecturer and tutor, instructor, adjunct professor and professor.

SCHOOL CHILDREN AT THE TUBERCULOSIS EXHIBITION.

THE two photographs on the opposite page show lines of school children entering the north and south entrances of the Museum. Between January 4 and 15 (ten school days) the Museum received within its doors six thousand children daily. Ushered, a thousand at a time, into the auditorium, they were given facts concerning tuberculosis and personal hygiene preventing it, and directions for study of the International Tuberculosis Exhibition. When dismissed from the auditorium, giving place to a second set of a thousand, they were guided through the exhibition, to watch the light that went out every two minutes thirty-six seconds showing how often someone dies of tuberculosis in the United States, to see dark, dirty rooms contrasted with light and clean ones, to examine many inviting tents for out-of-door living — one very amusing to them because it allowed a person to sleep with his body in the house and his head out of the window. Then from the exhibition the long lines filed into the Bird Group Halls and on to other parts of the Museum. There can be no doubt that the suspension of their school work and the unusual expedition, combined with the serious force of the impression received after reaching the Museum, brought before them with unwonted importance not only the social evil, tuberculosis, but also many matters of personal cleanliness and home sanitation.

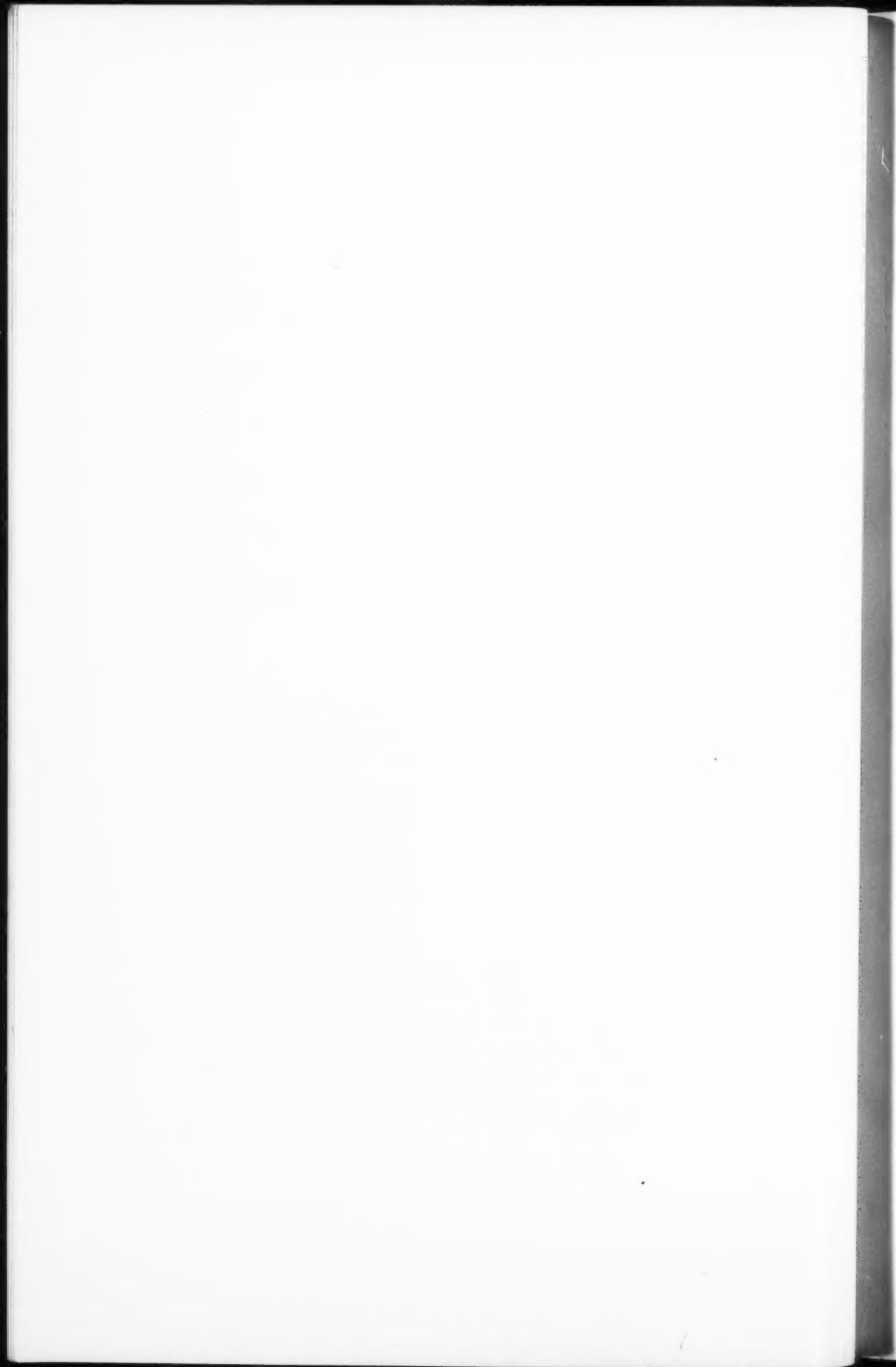
* * *

The two weeks' educative work above referred to illustrates one of the large ways in which the Museum serves the people above and beyond its more specific work in science. That the Museum is practicable for direct use in lesser ways also is continually demonstrated. Recently inquiry came for a most resonant wood to be used in the construction of violins. Tests were made in the Forestry Hall, and Douglas spruce was chosen after opportunity for examination of five hundred North American woods. Later another inquirer sought wood absolutely non-resonant for use at the heart of a soundless typewriter. His tests in the Forestry Hall resulted in the choice of palmetto for his purpose. Another instance concerns Peruvian mummy cloths. Probably more than a thousand art students have visited the Museum within the past six years to copy patterns of these cloths or to study their coloring. Many of these students have become successful designers, and as a result numbers of our modern wall papers, rugs and other house-



PUBLIC SCHOOL CHILDREN APPROACHING THE NORTH AND SOUTH ENTRANCES OF THE MUSEUM TO VISIT THE INTERNATIONAL TUBERCULOSIS EXHIBITION.

The average number was 6,000 per day for two weeks.



furnishing goods show some sign of the color combinations and of the fish, bird and cat patterns peculiar to Peruvian mummy cloth. Reports of such instances of direct influence on the art and industries of the country might be multiplied indefinitely, sometimes the need entailing information about precious corals, or some tree advisable for planting in a commercial venture, or sometimes having to do with materials for an artist's sketch of a Sioux maiden, design of grotesque fish or quaint and unusual models for pottery and glass.

MUSEUM NEWS NOTES.

THE Museum is fortunate in having secured the John William Waters collection of ethnological objects from Fiji. The collection comprises about 1800 specimens, including household utensils and implements of war and the chase, made of stone, turtle shell and wood. Mr. Waters lived for forty years on the island, and his knowledge of the people and their customs enabled him to bring together this remarkable collection, the value of which is enhanced by the fact that it represents the life of the Fijians before they had become acquainted with iron and its uses.

THE following members have been elected since the last issue of the Journal: Life Members, MESSRS. HUGH HILL, J. S. MORGAN, JR., and HENRY S. MORGAN, MISSES JANE N. MORGAN and F. T. MORGAN and MMES. J. PIERPONT MORGAN, JR., and DAVIES COXE; Annual Members, MESSRS. A. PERRY OSBORN, A. F. TROESCHER, A. G. VETTER, P. S. TRAINOR, JACOB OLESHEIMER, WM. EDMOND CURTIS, JAMES W. GREENE, R. J. SCHAEFER, GEORGE E. CHATILLON, E. C. KLIPSTEIN, B. G. MEYER, A. C. BECHSTEIN, WASHINGTON L. COOPER, FREDERICK A. LIBBEY, CHARLES H. WEIGLE, C. B. ISHAM, EDWARD H. FLOYD-JONES, JESSE LANTZ and ALANSON P. LATHROP, DR. CHARLES K. BRIDDON, GENERAL HORACE PORTER, MISSES LOUISE D. VAN BEUREN and E. MABEL CLARK and MRS. JAMES A. RUMRILL.

DR. FRANK E. LUTZ has been appointed an assistant curator in the Museum. Dr. Lutz has been an investigator in the Carnegie Institution at Cold Spring Harbor and has published a score or more of papers on the general subjects of Inheritance and Variation.

MR. ALEXANDER PETRUNKEVITCH, an authority on American spiders, has become officially connected with the Museum in the capacity of Honorary Curator of Arachnida. This appointment was made by the Board of Trustees in appreciation of the invaluable service which Mr. Petrunkevitch has rendered the institution for several years through correspondence, exchange and the general enrichment of the collections.

LECTURE ANNOUNCEMENTS.

MEMBERS' COURSE.

The second course of lectures to members of the Museum and their friends will begin February 25 and will be devoted to the Conservation of Natural Resources. Details will be announced in a special circular.

LEGAL HOLIDAY COURSE.

Washington's Birthday, February 22, 1909, at 3.15 o'clock P. M.
No tickets required.

"Some of the Food and Game Fishes of the Eastern United States.—
Habits and Methods of Capture." By ROY W. MINER.

Fully illustrated with stereopticon views.

COLUMBIA UNIVERSITY COURSE.

JESUP LECTURES.

Given in coöperation with Columbia University.
Wednesday, February 3, at 8:15 o'clock P. M.

The last of a course of ten lectures on light by PROFESSOR RICHARD C. MACLAURIN of Columbia University.

"Some relations between light and electricity."

A COURSE IN BIOLOGY.

Arranged by the Biology Departments of the Normal College and the High Schools of Manhattan. Illustrated with stereopticon views.

Thursday afternoons at 3:30 o'clock.

- January 14.—“American Forests and Their Uses.” By GEORGE H. SHERWOOD.
 February 18.—“Our Atlantic Fisheries.” By DR. HERMON C. BUMPUS.
 March 18.—“Public Health.” By DR. THOMAS M. DARLINGTON.
 April 15.—“Natural History of Animals.” By DR. HENRY E. CRAMPTON.

DARWIN MEMORIAL CELEBRATION.

HELD in coöperation with the New York Academy of Sciences.
 Friday, February 12, 3:30 o'clock P. M.

Addresses will be delivered as follows:

Presentation to the Museum of a bronze bust of Darwin by CHARLES FINNEY COX, President of the Academy.

Acceptance on behalf of the Trustees of the Museum by HENRY FAIRFIELD OSBORN, President of the Museum.

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Tuesday evenings at 8 o'clock.

- February 2.—IAN C. HANNAH, “Japan's Transformation.”
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 February 23.—ISYA JOSEPH, Ph.D., “Mohammed and Mohammedanism.”
 (Illustrated with costumes.)

Saturday evenings at 8 o'clock.

- February 6.—H. A. SMITH, “National Forest Policy.”
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Second Mondays, Section of Biology.

Third Mondays, Section of Astronomy, Physics and Chemistry.

Fourth Mondays, Section of Anthropology and Psychology.

On Tuesday evenings, as announced:

The Linnæan Society of New York, The New York Entomological Society and the Torrey Botanical Club.

On Wednesday evenings, as announced:

The New York Mineralogical Club.

On Friday evenings, as announced:

The New York Microscopical Society.

The programmes of the meetings of the respective organizations are published in the weekly *Bulletin* of the New York Academy of Sciences and sent to the members of the several societies. Members of the Museum on making request of the Director will be provided with the *Bulletin* as issued.

The American Museum Journal

EDMUND OTIS HOVEY, *Editor*.

FRANK M. CHAPMAN,
LOUIS P. GRATACAP, } *Advisory Board*.
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AMERICAN MUSEUM OF NATURAL HISTORY

The Habitat Bird Groups



CAMP AT PTARMIGAN PASS, CANADIAN ROCKIES

By **FRANK M. CHAPMAN**

Curator of Ornithology

GUIDE LEAFLET NO. 28

FEBRUARY, 1909

American Museum of Natural History
Seventy-seventh Street and Central Park West, New York City

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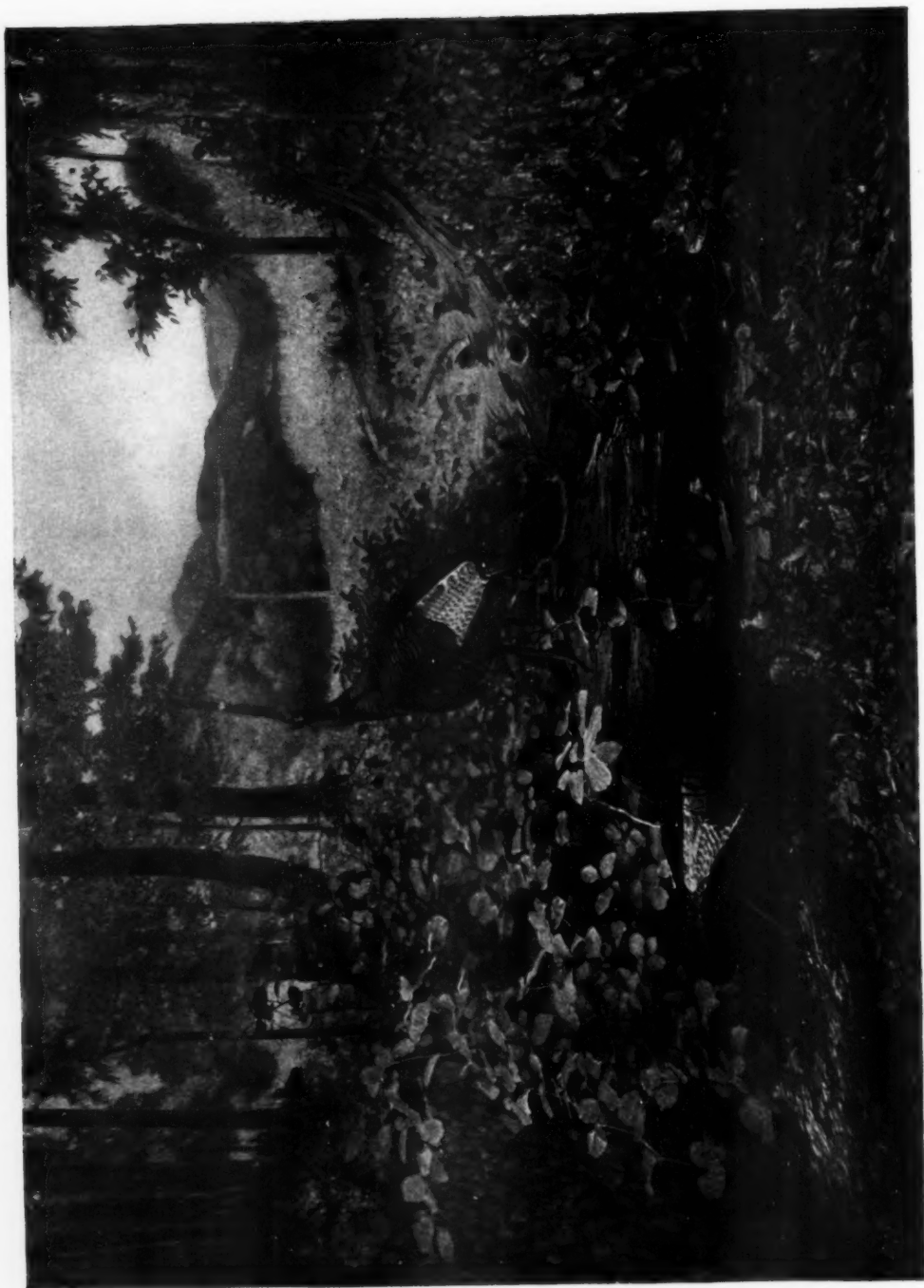
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WILD TURKEYS IN THE MOUNTAINS OF WEST VIRGINIA.

Made by H. C. Denlow

Made printed by H. C. Denlow

The Habitat Groups
OF
NORTH AMERICAN BIRDS
IN THE
AMERICAN MUSEUM OF NATURAL HISTORY

By **FRANK M. CHAPMAN**

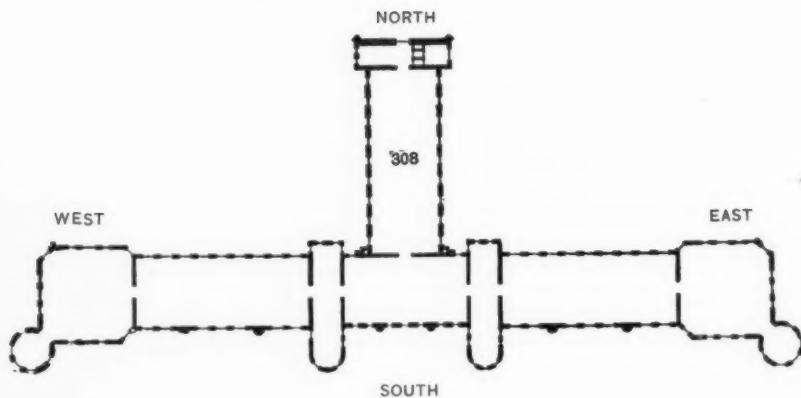
CURATOR OF ORNITHOLOGY

NO. 28
OF THE
GUIDE LEAFLET SERIES
OF THE

AMERICAN MUSEUM OF NATURAL HISTORY

EDMUND OTIS HOVEY, EDITOR

New York. Published by the Museum. February, 1909



SKETCH PLAN OF THIRD, OR GALLERY, FLOOR.

The Habitat Groups of North American Birds are in Hall No. 308 on the Third, or Gallery, Floor of the North Central Wing of the Museum building.

THE HABITAT GROUPS OF NORTH AMERICAN BIRDS
IN THE
AMERICAN MUSEUM OF NATURAL HISTORY

BY FRANK M. CHAPMAN

Curator of Ornithology

Introduction

THE groups of birds contained in this hall are designed to illustrate not only the habits but also the haunts or "habitats" of the species shown. Each group usually includes the nest, eggs and young, besides the adult bird or birds, with a reproduction of from 60 to 160 square feet of the nest's immediate surroundings. To this accurate and realistic representation of the home of the species is added a painting from nature of its habitat, the real foreground being connected with the painted background in such a manner that one often does not at first see where the former ends and the latter begins. The whole, therefore, gives an adequate conception of the nature of the country the birds inhabit and the conditions under which they live.

It should be clearly understood that these backgrounds are not more or less fanciful sketches of the haunts of the birds associated with them, but they are careful studies from nature of definite localities, and therefore possess a geographical as well as an ornithological value. When selecting subjects for treatment, an effort was made to include the birds of widely diversified types of country, in order that the series, as a whole, should portray not only the habitats of certain American birds, but America as well. From the Bahamas to the Gulf of St. Lawrence, from the Atlantic to the Pacific, localities are represented which show at least the more characteristic phases of our landscape, and it is hoped that a tour through this hall of Habitat Groups will not only yield information in regard to North American birds, but also give one some conception of the appearance of the land in which they live.

AMERICAN MUSEUM GUIDE LEAFLETS

Some subjects were in nearby places and were easily visited; others were in remote regions and were reached with more or less difficulty.¹ It is estimated that about 65,000 miles have been traveled to secure the material on which the groups are based.

Each group in the series, beginning with Bird Rock in the Gulf of St. Lawrence, in 1898, is the result of a special Museum expedition in charge of the Curator of Ornithology usually accompanied by a preparator, and one of the artists whose names appear in connection with the backgrounds they have painted.

After arriving, before securing specimens, the birds were first studied and photographed at short range from an especially constructed umbrella-blind. This was sometimes placed in the very heart of the bird community, as, for instance, with the Flamingos and Pelicans; or even in the tree-tops as with the Egrets. At the same time the artist made studies on which to base the final background, as well as detailed color sketches of leaf and blossom, while the preparator collected the needed accessories, making casts or preserving vegetation in various solutions as occasion required. When the field-work was concluded, the crates of branches, carefully packed boxes of foliage, nests, birds and photographic plates, sacks of earth and other material, according to the nature of the subject, were shipped to the Museum, subsequently to be prepared in the laboratories.

The vegetation, for which Mr. J. D. Figgins, Chief of the Museum's Department of Preparation is responsible, has been reproduced in wax either from plaster casts of the original, or by careful duplication of the original itself. The color has been applied with an air-brush or atomizer, by which the most delicate tints and textures are faithfully rendered.

Each group has demanded its own special treatment, and, in the construction of the series, the many novel problems encountered have resulted in the development of original methods. This is particularly true of the manner of installation and illumination of the groups at the sides of the hall. Here, it will be observed, the background is curved, with the front opening so reduced in size that at the proper distance, or

¹The narrative of these expeditions is contained in "Camps and Cruises of an Ornithologist" by Frank M. Chapman. Chapters of this book have been bound separately and placed with the groups to which they relate.

CHAPMAN, THE HABITAT GROUPS

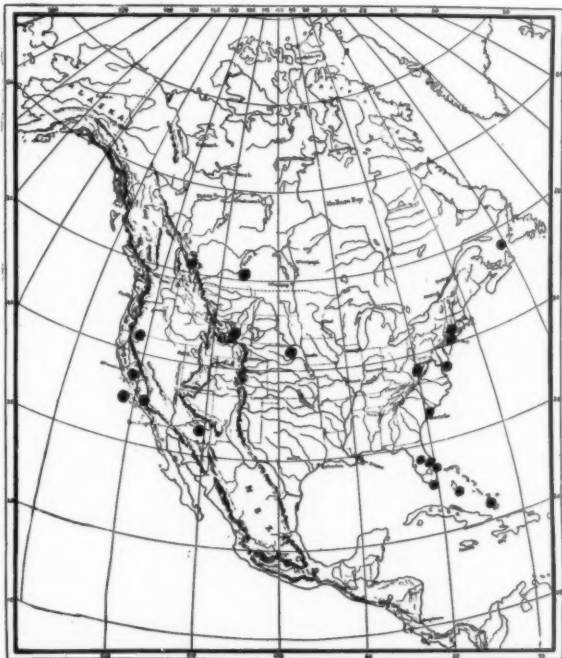
"correct view-point," neither the ends nor the top of the group can be seen. By thus leaving the actual limits of the group to the imagination the illusion of space and distance is greatly heightened.

The groups are illuminated from above by diffused light; electric light being employed when daylight fails, but, in either case, the rays strike the group from the same diffusing surface.

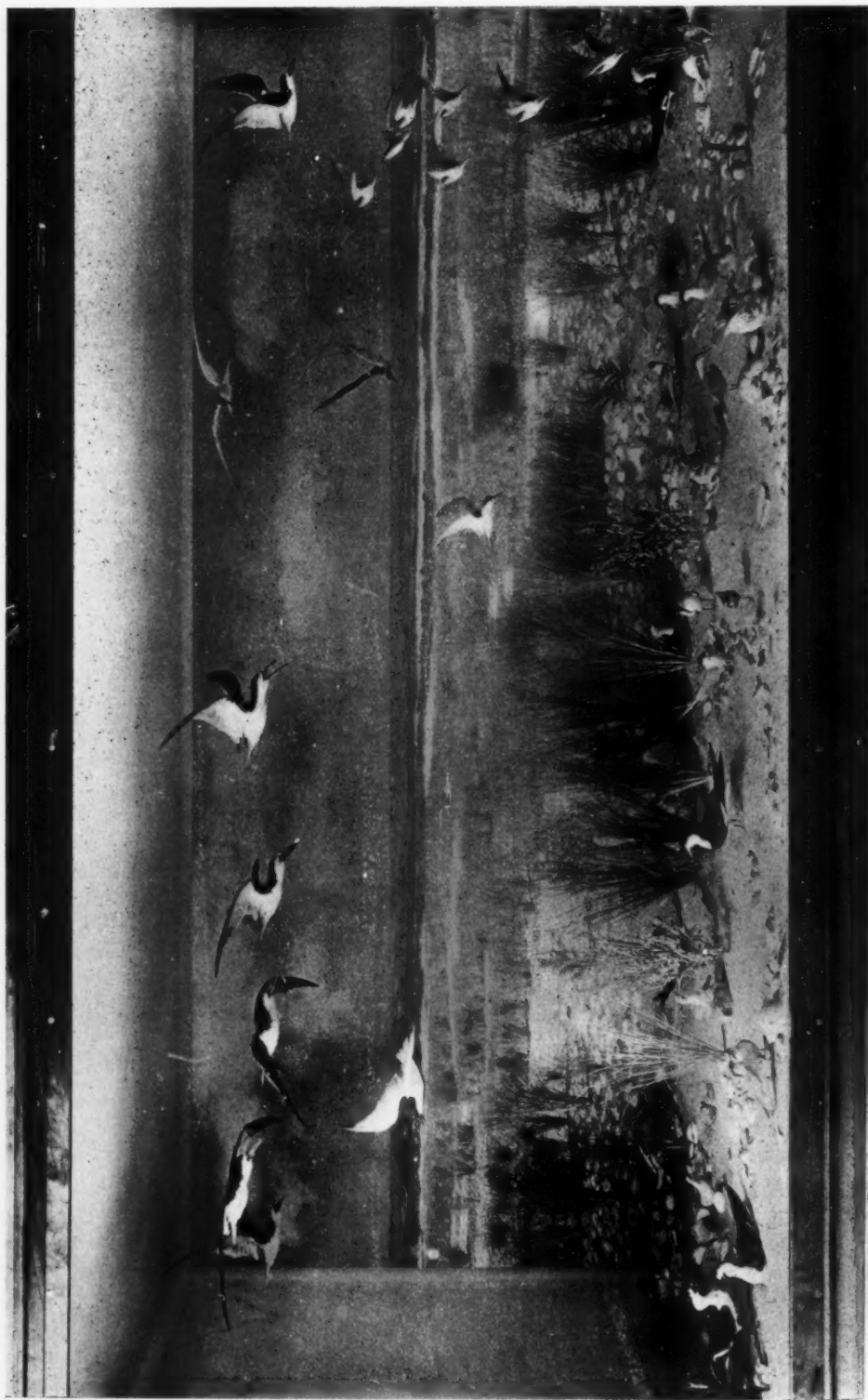
Acknowledgments.

The Museum owes this series of Bird Groups primarily to the generosity of a number of its members, without whose contributions the collection and preparation of the material would not have been undertaken.

For this valuable coöperation the Museum is indebted chiefly to Mr. John L. Cadwalader and to Mrs. Morris K. Jesup, Mrs. Philip Schuyler, Mrs. John B. Trevor, Mrs. Robert Winthrop, Mr. F. Augustus Schermerhorn, Mr. H. B. Hollins, Mr. Henry Clay Pierce, Mr. Henry W. Poor and Mr. Courtenay Brandreth.



MAP INDICATING LOCALITIES REPRESENTED BY THE GROUPS.



SUMMER BIRD-LIFE OF COBB'S ISLAND, VIRGINIA.
Background by Walter Guss. Birds by H. C. Pondrey.

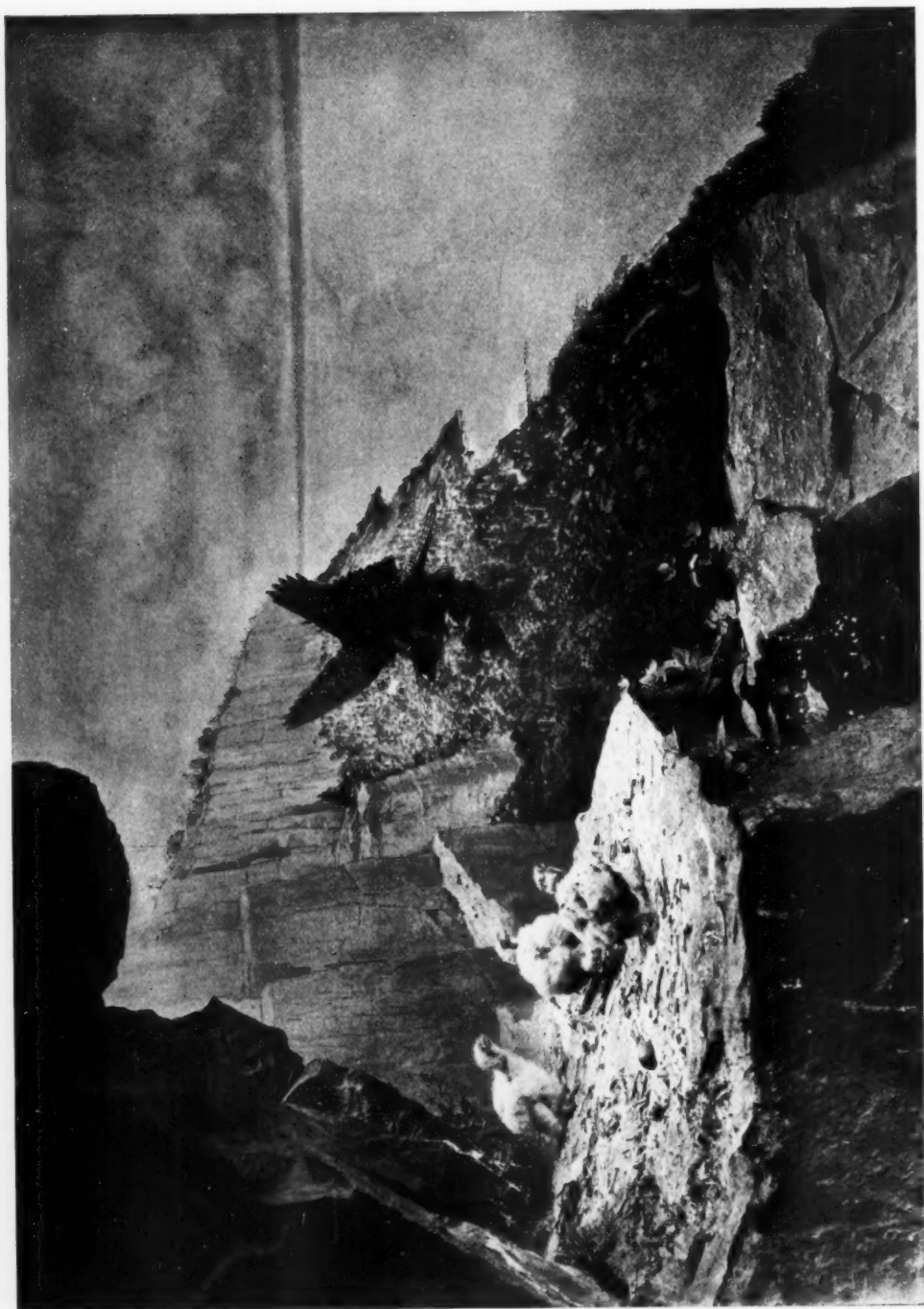
SUMMER BIRD-LIFE OF COBB'S ISLAND, VIRGINIA

ASHELL-STREWN sand bar seven miles long and about the same distance from the mainland, Cobb's Island, off eastern Virginia, is an ideal resort for sea-birds. Here they are beyond the reach of most bird enemies, while the surrounding waters furnish an unfailing supply of food. The home of the birds has little or no value as "real estate"; they themselves are unfit for food, and it might have been supposed that their continued existence was assured. But about twenty-five years ago they suddenly acquired a commercial value. Their plumage became fashionable for millinery purposes. As a result, thousands of birds were slaughtered on their nesting-grounds, and within a few seasons some of the most abundant species were practically exterminated.

At no place were more birds killed than on Cobb's Island and the islands immediately adjoining it. In a single day 1,200 Least Terns were shot on Cobb's Island; in three days three baymen killed 2,800 Terns in the same locality, at the end of two seasons the Least Terns, for which there was especial demand, no longer existed in this region, and the Common Terns were greatly reduced in numbers. Fortunately the State of Virginia passed a law prohibiting the killing of these birds, and for several years past the National Association of Audubon Societies has provided a warden to enforce this law during the nesting season.

In response to this protection the birds are now increasing in numbers and in time may become as abundant as they formerly were. The Least Terns have not as yet reappeared on Cobb's Island, there being no stock to begin with; but the Common Terns are yearly becoming more numerous, several hundred pairs having nested on the island in the summer of 1902.

Besides the Common Terns, Skimmers, Gull-billed Terns, Oystercatchers and Wilson's Plovers now nest on the beach of Cobb's Island; while in the marshes which flank the beach on the bay, or west side, numerous Laughing Gulls, a few Forster's Terns and many Clapper Rails, or Marsh Hens, make their nests.



THE DUCK HAWK ON THE PALISADES.
Background by Hobart Nichols.

THE DUCK HAWK ON THE PALISADES

THE Duck Hawk is the American representative of the Old World Peregrine Falcon, from which it differs but slightly in color and not at all in general habits.

By falconers the Peregrine was esteemed only second to the Arctic Gyrfalcons. The latter could be owned and flown only by members of the royal family, while no one of lower rank than an earl was permitted to use a Peregrine.

Possibly the restrictions imposed on the owning of Gyrfalcons arose rather from the difficulty with which the birds were obtained than from their superiority as hunters. In this respect the Peregrine or Duck Hawk is probably not excelled by any other bird of prey. Its speed enables it to overhaul with ease the swiftest flying ducks, while it has sufficient strength to strike and kill them in the air and bear them away without visible effort.

The Duck Hawk is fearless in pursuit of its prey and will dash down and capture a wounded bird within reach of the sportsman's arm; and will repeat the attempt even if fired at and missed.

Peregrines in slightly varying forms are found throughout the greater part of the world. The Duck Hawk, the American form, breeds locally throughout most of the United States, and migrates as far south as Chili. When migrating, it is sometimes not uncommon along our coasts, since it travels with the flocks of wild fowl on which it preys, but when nesting, it is generally rare.

In the vicinity of New York City the Duck Hawk is known to nest only on the Palisades of the Hudson, where they are unfortunately molested by egg-collectors, and among the hills and mountains to the northward. It is believed that, in the spring of 1908, three pairs were nesting on the Palisades.

In this region Duck Hawks begin to lay in March. They build no nest, but lay their eggs, as may be observed, on the bare rock.

The material for the present group was collected by R. B. Potter on Hook Mountain, near Nyack, N. Y., but it is here shown against a background representing the Palisades, northward from the "Gorge" at Englewood.



AUGUST BIRD LIFE OF THE HACKENSACK MEADOWS.
Background by Bruce Horsfall. Birds by E. W. Smith.

AUGUST BIRD-LIFE OF THE HACKENSACK MEADOWS

THE thousands of acres of marshland bordering the Hackensack River and Newark Bay, so familiar to travelers over the railways which pass through them, are commonly esteemed worthless ground, but to the naturalist they abound in interest.

In their lower portion, colonies of Florida Gallinules and Pied-billed Grebes have recently been found nesting; but it is in August that birds are most abundant in the marshes, and they then possess the strongest attraction for the ornithologist. At this season the wild rice begins to ripen, bringing to the marsh a large though ever decreasing number of Bobolinks and Sora Rail which delight to feed upon it.

The Bobolink is now in its streaked, sparrow-like plumage and under the name Reedbird is ranked in New Jersey as a game bird (!) and is killed in thousands by men who would not raise a finger against the black and buff songster of our June meadows.

The Sora, in spite of its small size and sluggish flight may, with greater reason, be ranked as a game bird, but at the present rate of decrease it will pay the penalty of this distinction by practical extermination in this region. Red-winged Blackbirds also come to feed on the rice.

During the latter half of July, August and September, Swallows, by far the most abundant birds of the meadows, use the marshes as dormitories, coming to them in the evening in incalculable numbers to sleep, and leaving them early the following morning to radiate to every point of the compass. During the day, and as the birds gather for their evening flight, they may be seen perching in long lines on roadside telegraph lines.

In August the marshes are as remarkable for their flowers as for their birds. The great rose mallow is doubtless the most beautiful, as it is also one of the most abundant species, acres sometimes being pink with the bell-shaped flowers. There are also brilliant cardinal flowers, saggitaria, pickerel weed, jewel flowers, all of which are shown in the group, and many other species.

The studies for this group were made about one mile south of Little Ferry, N. J. The view shown is toward the west.



FLORIDA GREAT BLUE HERON.

Background by Bruce Horsfall. Birds by H. C. Denslow.

THE WILD TURKEY IN THE MOUNTAINS OF WEST VIRGINIA

Frontispiece

THE Wild Turkey, in spite of its name, is distinctly an American bird which formerly ranged throughout the wooded portion of the eastern United States, from southern Maine and southwestern Ontario, south to Florida and southwest to New Mexico and Arizona, whence it extends southward onto the Mexican tableland.

It has now become rare or extirpated in the more settled portions of its range and is rarely found as far north as Pennsylvania and Ohio.

Throughout its wide range, the Wild Turkey presents some variations in color, the extremes of which are shown by the Eastern Wild Turkey and the Mexican Wild Turkey. These birds differ chiefly in the color of the tips of the tail-feathers and upper tail-coverts, which in the eastern bird are chestnut, and in the Mexican bird, whitish.

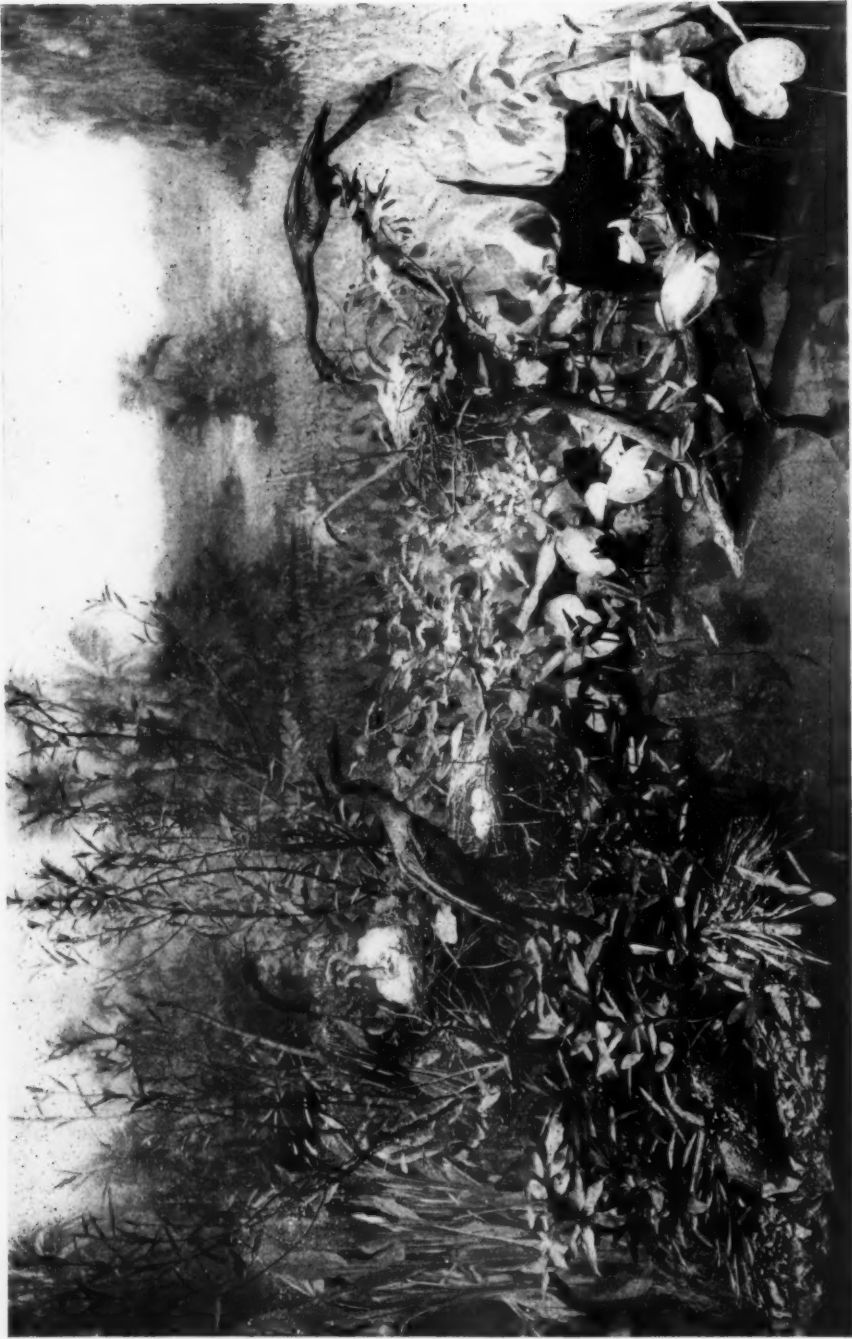
Singularly enough, our barnyard Turkey is descended from the Mexican bird, which the Spaniards found among the Aztecs in a state of domestication. It was introduced from Mexico into Europe, where it had become well established in 1530, and from Europe was brought by the colonists to Eastern North America.

Although the domesticated bird will readily cross with the wild one, no extensive effort has been made to domesticate the latter and the inhabitants of our barnyard still show the whitish tipped tail and tail-coverts of their Mexican ancestors.

FLORIDA GREAT BLUE HERON

THE Great Blue Heron, often miscalled "Crane," is distributed throughout North America. On the humid northwest coast it is darker than in Eastern North America; in the arid Great Basin region it is paler, and the Florida form, known as Ward's Heron, is somewhat larger than the others.

Hérons are more aquatic than Cranes and feed largely on fish. In the eastern states they invariably nest in trees, but in the West they often nest among the reeds like Coots. Young Herons are born in a more or less naked condition and are reared in the nest; Cranes are hatched with a downy covering and can run about shortly after birth. Herons fly with a fold in the neck, but Cranes keep the neck outstretched.



THE SNAKE-BIRD OR WATER-TURKEY.
Background by Bruce Horsfall.

THE ANHINGA, OR WATER-TURKEY, IN FLORIDA

THE fact that the Anhinga sufficiently resembles both a turkey and a snake to have received the names of "Water Turkey" and "Snake-bird" is an excellent comment on the peculiarity of the bird's appearance and habits.

The first-mentioned name finds its origin in the highly developed, broadly tipped, turkey-like tail. The second relates to the long, slender, snake-like neck, and when the bird swims with its body submerged and only the long shining neck, head and sharply pointed bill above the water, the resemblance to a serpent is greatly increased. (See bird in group.) It may be added that the bird's book name of "Anhinga" is of Portuguese origin and means snaky.

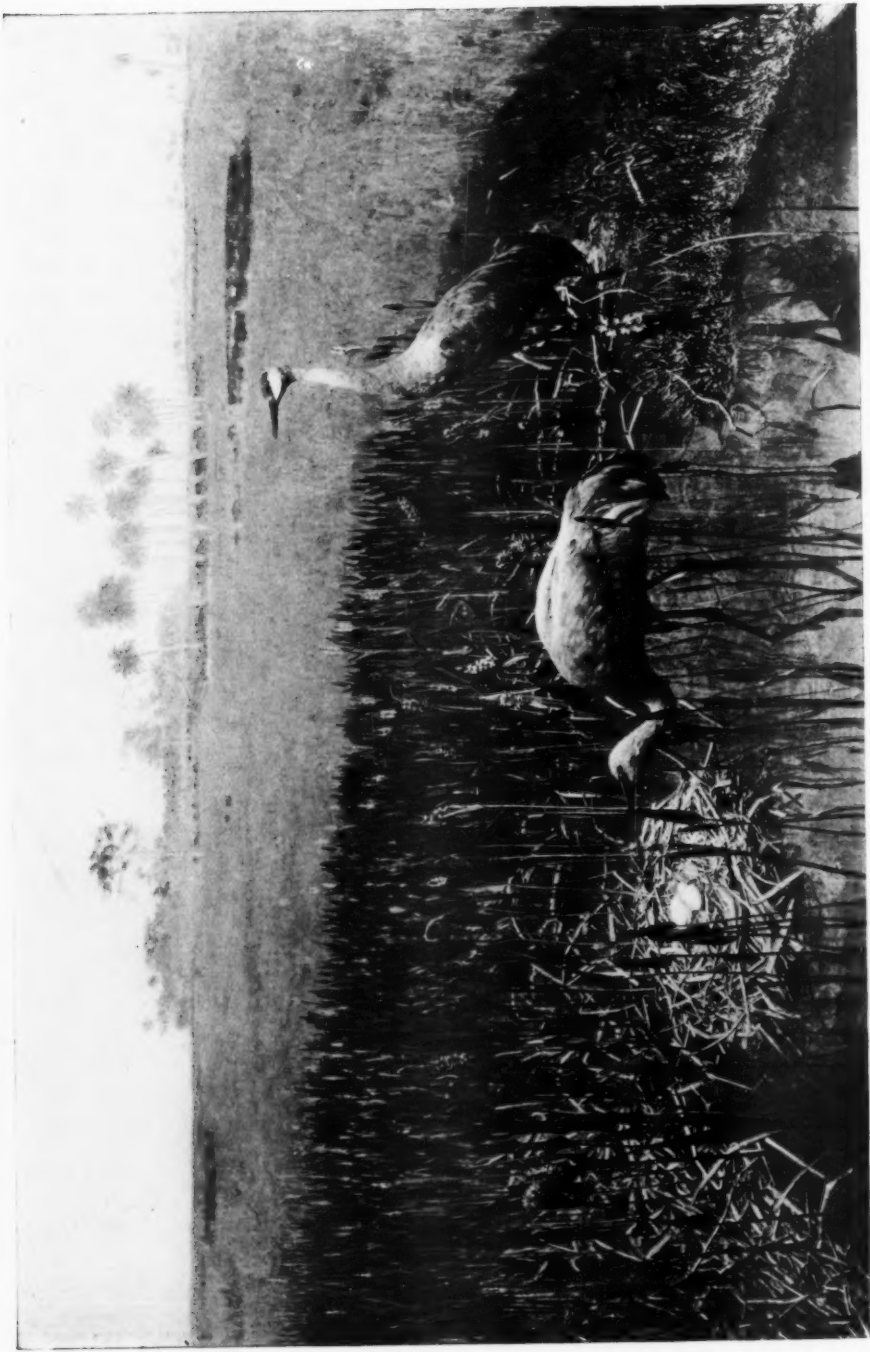
The Anhinga is equally at home in the water and high in the air, combining in an unusual manner the habits of an aquatic and an aerial bird. Its firm, close plumage and broadly webbed feet — all four toes being united by membranes as in the Cormorants — admirably fit it for life in the water, and it not only dives with great ease, but pursues and captures its prey under water, the tip of the bill being provided with fine tooth-like serrations to enable it to grasp its slippery victims.

After prolonged submersion the Anhinga's plumage, in spite of its texture, becomes more or less saturated with water, hence the bird, while drying its feathers, stands with wide-open wings. (See bird at right.)

The Anhinga's webbed feet make it at home in the water, but it is the bird's tail which renders it, for a diving bird, equally at ease in the air. With spread wings and tail it soars in circles, hawk-like, for long periods, evidently for the pleasure it finds in this exhilarating form of exercise.

Anhingas are born naked and are reared in the nest, which is a remarkably well-made structure. When a few days old, a buff down begins to appear which soon covers them. Like the young of Pelicans and Cormorants, they secure their food from the parent's throat.

The background represents a "bonnet," or yellow pond lily, lake with its surrounding cypresses and palmettoes, 17 miles west of St. Lucie, Florida.



THE SANDHILL CRANE IN FLORIDA.
Background by Bruce Horsfall. Birds by Herbert Lang.

THE SANDHILL CRANE ON THE KISSIMMEE PRAIRIES

IN 1632, when Morton wrote of New England birds, "of Cranes there are a great store — they sometimes eate our corne and doe pay for their presumption well enough — a goodly bird in a dishe and no discommodity," he referred to the species in this group. At that time it was doubtless common throughout North America, now it nests in the Atlantic coast States in Florida only, and, in the interior, only in the upper Mississippi Valley and in the Canadian border states westward to Oregon and northward into Canada.

In Florida the Sandhill Crane is still common on the great Kissimmee Prairies and their adjoining low, pine-grown lands, where the studies for the present group were made. Here, in March, it commonly builds its little island nest in the water-filled depressions thickly grown with a species of pickerel weed locally known as "bull-tongue."

Nest-building is preceded by the singular antics of courtship, when both males and females hop, skip and jump about one another, bowing low and leaping high, all the time croaking and calling. Their matrimonial affairs settled, one hears only the loud, but sonorous, trumpeting of the male, which, when heard near by, is harsh and rasping, but, when softened by distance, becomes one of the most attractive sounds of a Florida dawn.

Although superficially resembling Herons, Cranes are more nearly related to the Rails. Young Cranes, like young Rails, are born thickly covered with down, and they run shortly after leaving the egg. The young Heron, on the contrary, is born scantily covered with hair-like feathers and spends over a month in the nest. Cranes further differ from Herons by flying with the neck fully distended (see the birds in the painting) while Herons fly with a fold in the neck which brings the head nearly back to the shoulders.

Cranes are less aquatic than Herons. One may see them walking about the pine-woods or over the prairies, dignified, stately figures, hunting for seeds, roots, grasshoppers, snails or lizards, while near the water frogs are captured.



THE BROWN PELICAN ON PELICAN ISLAND, FLORIDA.
Background by Bruce Horsfall. Birds by E. W. Smith.

THE BROWN PELICAN ON PELICAN ISLAND, FLORIDA

BROWN Pelicans normally nest in bushes, and when the birds first came to Pelican Island, Florida, the island was covered with mangroves, in which the birds placed their nests. Severe frosts and over-use by the Pelicans have killed all but a few trees. When these are occupied by from two to five nests each, the remaining birds build their nests on the ground, most of them resorting to a sand-bar at the east end of the island, where they are as thickly grouped as the painting indicates.

The young Pelican (ground nest, front, left, in the group) is born naked. When about ten days old a downy plumage begins to appear which soon changes the bird from black to snowy white (ground nest, front, rear, and center, front). The brown flight-plumage now begins to grow, showing first in the shoulders and humeri (ground nests, front, center and right) and at the age of about two months this plumage is fully developed.

The young are fed on predigested fish regurgitated by the old bird into the tip of the pouch (ground nest, left, rear). Later the young birds (sometimes all three at once) eagerly thrust their heads into the parent's mouth and get their first fish from the base of its pouch. Possibly in this habit may be found the origin of the myth in which the parent Pelican opens her breast to supply nourishment for her offspring. When the young Pelican secures fish longer than it can swallow, it sits with the tail projecting from its mouth patiently waiting for the head to digest (ground nest, center, front).

The inhabitants of Pelican Island have often been wantonly molested by man, and at times the vandalism of tourists, who killed the birds and robbed them of their eggs, has threatened the existence of this remarkable colony. To prevent so unfortunate a catastrophe, President Roosevelt has set aside Pelican Island as a government reservation, and the National Association of Audubon Societies employs a warden to guard it during the nesting season. Only visitors who have secured a permit from this warden (P. Kroegel, Sebastian, Florida) are allowed to land on this island.



THE AMERICAN EGRET IN A SOUTH CAROLINA CYPRESS FOREST.
Background by Bruce Hornsfall. Birds by Herbert Lang.

THE AMERICAN EGRET IN A SOUTHERN CAROLINA CYPRESS FOREST

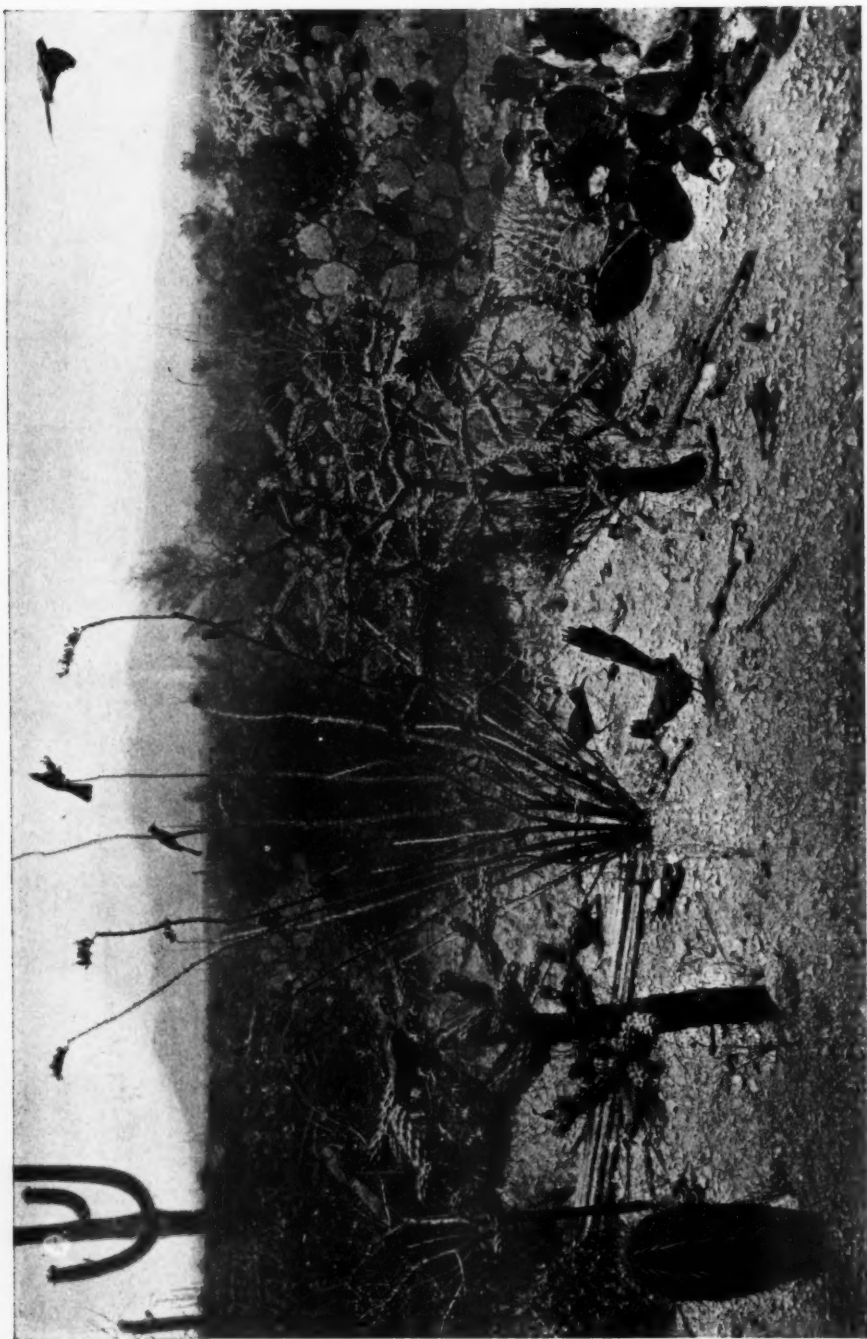
ANYONE who knows how abundant the Snowy "Hérons" or Egrets were in our southern States twenty-five years ago, will doubtless be surprised to learn that no little difficulty was experienced in finding a locality where the necessary studies could be made for an Egret group. So effectively, indeed, have the plume-hunters done their work that it was feared that this beautiful and fast-vanishing species could not be included among the Habitat Groups, when, quite by chance, a colony of Egrets was heard of on a shooting preserve in South Carolina. It appears that when the land was acquired it contained a few Egrets, survivors of a once flourishing colony. The new owners rigidly protected them, and they soon began to increase, forming, at the end of seven years, a rookery which would have done credit to the days of Audubon.

The nests were in cypresses at an average height of forty feet, and the birds were studied and photographed from a moss-draped blind attached to the limb of a tree forty-five feet above the water.

Sketches for the background were also made from the trees in order to secure the desired effect of height.

The plumes or "aigrettes" for which this Heron and its near relatives inhabiting the warmer portions of the world have been slaughtered are worn by both sexes. They are acquired prior to the nesting season and constitute the birds' wedding costume, to be displayed as the pose of the bird in the group indicates. As the season advances and they become frayed and dirty, they are shed.

Aigrettes are to be secured, therefore, only during the period of reproduction, and this fact, added to the Heron's communal habits, accounts for the surprising rapidity with which the birds have been brought to the verge of extinction. Concealed in the rookery, it is a simple thing to shoot the parents as they return with food for their young; and in the early days of "pluming," it was not unusual for a man to kill several hundred birds at a sitting. It will be observed that the plumes grow only from between the shoulders, where a circular cut of the knife "scalps" the bird by removing the skin to which the forty or fifty aigrettes are attached.



A CACTUS DESERT AND ITS BIRD-LIFE.
Background by Bruce Horsfall. Birds by H. C. Denalov.

A CACTUS DESERT AND ITS BIRD-LIFE

THE great cactus-covered deserts, so characteristic of the more arid portions of Mexico, push a well-developed arm northward into Arizona, forming too marked a feature of North American scenery to be omitted from any series of representations designed to include at least the more pronounced types of our landscape.

Since this region has no colonies of birds and no one bird of sufficient size to be treated alone, it was decided to prepare a group which should show its common birds as well as its commoner forms of vegetation.

Tucson, in southern Arizona, was selected as a suitable locality for our studies, throughout which we had the invaluable advice of Dr. D. T. MacDougal, Director of the Desert Botanical Laboratory of the Carnegie Institution, which is situated at this point.

At the time (May 9-20, 1906) of our visit the desert vegetation was at its best, and looking out over the variously colored blossoms it was difficult to believe that we were not in a land of great fertility.

The birds of this region, like its plants, are of Mexican origin. Along the "washes," which after rains in the mountains are streams for a brief period, mesquites and acacias grow abundantly, and here such brightly colored birds as Cardinals and Vermilion Flycatchers are found. Where this irregular but natural type of irrigation is lacking, the vegetation is chiefly of cactus which, affording but little shelter for birds of bright colors, is inhabited chiefly by species of neutral-tinted plumage.

Here Mockingbirds and Thrashers (chiefly *Toxostoma curvirostre palmeri*), Cactus Wrens, Roadrunners, Gambel's and Scaled Quail, Texas Nighthawks, Inca, White-winged, and Mourning Doves, Black-throated Sparrows, Gilded Flickers and Crested Flycatchers (*Myiarchus*) nested in the giant cacti.

The making of the vegetation for this group called for unlimited skill and patience on the part of the preparator. Every joint of cactus shown is a facsimile reproduction of the original. Before making the plaster molds, every one of the hundreds of spines was carefully removed. After the casts had been taken from the mold (the *Opuntia* in wax, the others in plaster) they were colored from field studies of growing plants, and the original spines were then set in their proper positions.



CALIFORNIA CONDOR IN PIRU CAÑON.
Background by Carlos Hittell.

THE CALIFORNIA CONDOR

LEWIS and Clarke found the California Condor as far north as the Columbia River in Oregon, and, at this time, it was distributed southward through California to northern Lower California. This was assuredly a surprisingly restricted range for a bird possessing such unusual powers of flight; but it now occupies an even smaller area, being found only in the Coast Ranges of southern California, from Monterey County southward.

The Condor's rapid decrease is believed to have been occasioned by its feeding on the poisoned carcasses of cattle exposed by ranchmen as bait for bears, panthers and wolves. Since these predaceous animals have now become exterminated or greatly decreased, this unfortunate habit has been abandoned and the Condor is now holding its own.

The California Condor weighs from 20 to 25 pounds, and while not as heavy a bird as the Condor of the Andes, slightly exceeds it in stretch of wing, the average California Condor measuring about nine feet from tip to tip. When flying, the Condor bears a strong resemblance to the Turkey Buzzard, but when the two are seen together the Condor's much greater size is pronounced, while its white under wing-coverts are conspicuous as the bird soars overhead.

The Condor lays its single egg in crevices in the rocks or in caves without pretense of nest, in February and March, and the researches of Finley and Bohlman show that the young bird is between four and five months old before it makes its initial flight.

Studies for the present group were made in Piru Cañon, some twenty miles north of the village of Piru, and fifty miles southeast of Santa Barbara, where for many years a pair of birds had nested in a cave which pierced the vertical cañon wall 150 feet above the water. From this cave were taken when young the Condors now living in the National Zoölogical Park in Washington, D. C.

The visitor is supposed to be in the Condor's cave, from which he looks up the cañon. The cave was not occupied at the time the studies were made, a passing hunter having wantonly shot one of the birds.

Condors were also found by the Museum expedition up the Agua Blanca, a tributary of the Piru, on one occasion seven of the magnificent birds being in sight at once.



BRANDT'S CORMORANT AT MONTEREY, CALIFORNIA.
Background by Carlos Hittell. Birds by Herbert Lang.

BRANDT'S CORMORANT AT MONTEREY, CALIFORNIA

VISITORS to Monterey, California, on the Southern Pacific R. R., who have taken what is known as the "Seventeen-Mile Drive," may recall the rocky islet standing in the Pacific about a quarter of a mile off the coast near Cypress Point. This islet, and the Cormorants which each year nest upon it, are shown in this group.

Brandt's Cormorant also nests on other islets off our Pacific Coast, and it is a regular visitor to the rocks off the Cliff House at San Francisco, where, however, it does not nest.

Both when flying and when resting upon the water the Cormorant suggests a large duck. The resemblance, however, is superficial, the Cormorant being related to the Pelicans, Gannets, Anhinga and all other birds which have the hind toe connected with the front toes by a web.

The Cormorant is an expert diver and catches its food of fish by pursuing it under water, the hooked bill of the bird doing good service, while the broadly webbed feet propel it at great speed. It is the skill of the Cormorants in fishing that has led both the Chinese and Japanese fisherman to train the birds to act as assistants to them in pursuit of their calling.

The young Cormorant, in common with other members of its order, and unlike the downy young of ducks and geese, is born naked and passes more than a month in the nest. The young secure their food by thrusting their heads down the parent's throat. At first sight one might easily imagine that the old bird was trying to swallow its offspring.

When the young bird is a few days old, a thick black down begins to appear on it. Shortly after this coat becomes complete, it is succeeded by the flight plumage. This is dull brownish black, the glossy plumage of maturity being acquired later. As special adornments of the breeding season both the male and female Cormorant don certain spiny, white nuptial feathers on the back or about the head and neck, while the bare skin of the cheeks and pouch becomes brightly colored. In Brandt's Cormorant, as will be observed, the pouch is rich blue and the birds appear to distend it for the purpose of display.

Cormorants, like their near relatives, are virtually voiceless, a harsh, rasping call being their only note.



SUMMER BIRD-LIFE OF AN IRRIGATED PORTION OF THE SAN JOAQUIN VALLEY.

AT Los Banos, in the San Joaquin Valley of California, the waters of the San Joaquin River are used to flood vast areas to create grazing land for cattle. The region is naturally dry and arid, but irrigation soon transforms the desert into a series of creeks, ponds and marshes. The desert plants are replaced by *Sagittaria*, *Ranunculus*, tulés and cat-tails, and the desert birds give way to a remarkable assemblage of water birds, whose local distribution is governed by the presence or absence of water.

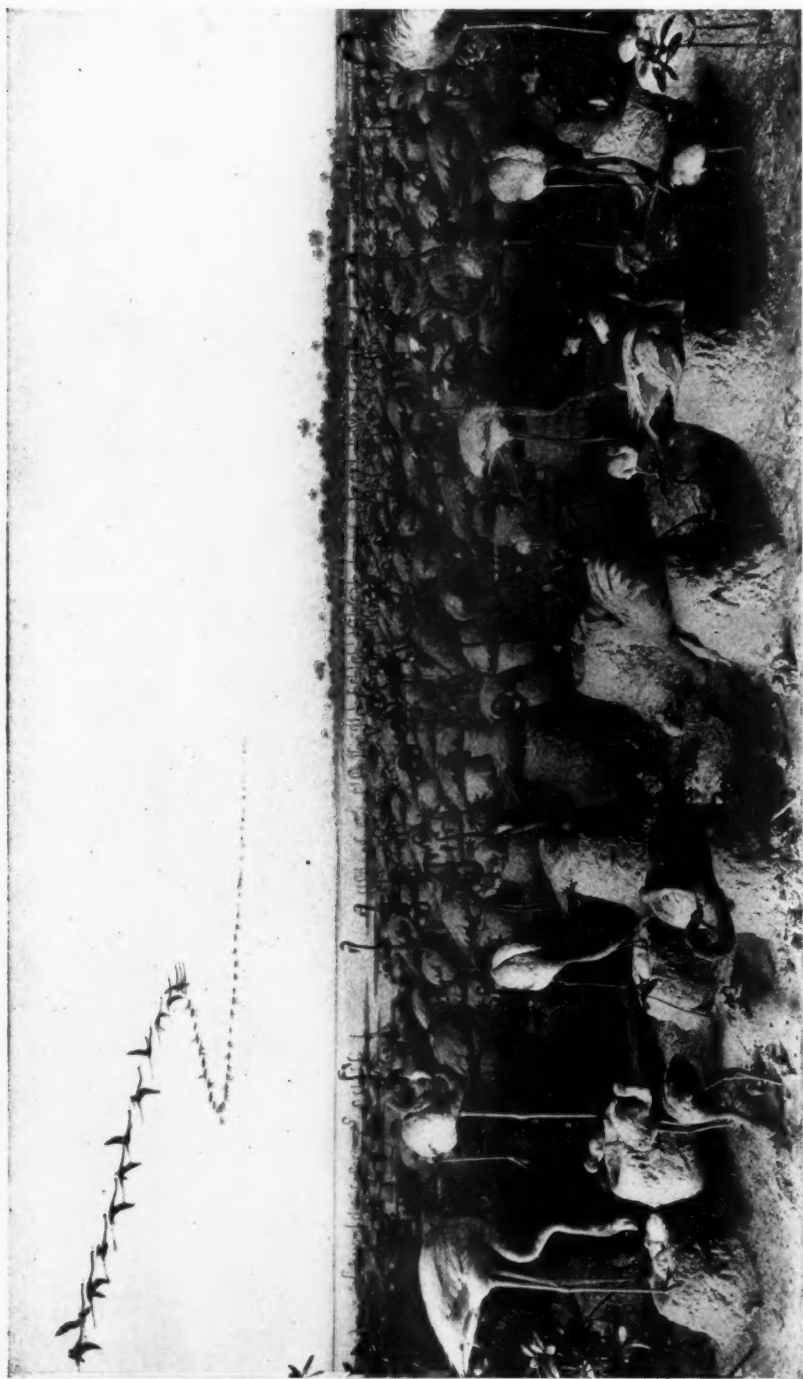
Driving along a levee, which extends as far as the eye can reach, the old and the new life is found to be separated only by the width of the dike. On the left is a parched and sterile plain with Horned Larks, Burrowing Owls, Jack-rabbits, Coyotes, Rattlesnakes and other characteristic desert forms; while on the right is water and fertility, with Ducks, Herons, Ibises, Coots, Stilts, Avocets and other aquatic species in countless numbers.

To the east the view stretches across the desert toward the distant Sierras, where on clear days may be seen the snow fields, which, eighty miles away, supply the water at one's feet. To the west (the view represented in the group) one looks over green marshes and shining ponds fairly twinkling with flitting wings, to yellow fields leading up through molded brown foot hills to the crests of the Coast Range.

The group contains only the commoner birds of the region, Black-necked Stilts, Avocets, Killdeer, Black and Forster's Terns, Black-crowned Night Herons, White-faced Glossy Ibises, Coots, Mallards, Pintails, Cinnamon Teals, Ruddy and Fulvous Tree Ducks.

While it is true one would not find all these species in a space eight by twenty feet, one could frequently see all or most of them in a single glance, and the impression the group seeks to convey is therefore within the truth.

The sudden changes occasioned by the irregularity of the water supply are often disastrous to the birds nesting here. The homes of birds which begin to nest before the water has reached its height are sometimes flooded, while the withdrawal of the water deprives the birds of its protection and makes their nests and eggs accessible to marauding animals.



A FLAMINGO COLONY IN THE BAHAMAS

BEFORE the studies for this group were made, very little was known about the nesting-habits of Flamingos. For this reason, and because of the belief that a reproduction of a Flamingo city (beyond question the most remarkable sight in the world of birds) would possess exceptional interest, an expedition was despatched to the Bahamas in 1902, to find Flamingos on their nesting grounds. It was unsuccessful; but in 1904, the search was resumed and on this occasion the birds were discovered, and from an artificial blind, concealed in the very heart of their rookery, containing 2000 birds, a series of unique photographs and observations was made.

The birds begin to lay their eggs early in May. Their nests are constructed by scooping up mud with the bill and patting it down with bill and feet. The nests are raised to a height of from eight to fourteen inches to protect their contents from a subsequent rise in the water.

Both sexes incubate; one by day the other by night. The young are born covered with down, like young ducks. They remain in the nest three or four days and during this period are fed by the parents on predigested juices of a mollusk of the genus *Cerithium*. (See standing bird at the left and also the sitting bird at the right, which is brooding and is about to feed.) They also eat the shell of the egg from which they have so recently emerged.

The singular shape of the bill of the adult Flamingo is related to the manner in which it secures the small spiral *Cerithium* shells which, in the Bahamas, appear to constitute its only food. To obtain them, the bill is pressed into the soft mud until its point turns upward. The lower mandible moves rapidly, forcing out the mud and water through the channels along the sides of the bill and leaving the shells.

It will be noted that the bill of the young Flamingo is essentially straight, but when about two weeks old the curve becomes evident and the young bird begins to feed as does its parent.

When a month old, a second downy plumage is acquired (see bird at right), and at the age of two months, this is replaced by a dress of brownish feathers (see bird at the left). In October or November this is probably followed by the pink plumage of maturity, since no brown birds are seen in the spring.



THE BOOBY AND THE MAN-O'-WAR BIRD IN THE BAHAMAS

CAY VERDE is a coral islet, some forty acres in area, situated about two hundred and thirty miles southeast of Nassau in the Bahamas. Like all reef keys, it is at the junction of a bank with the ocean, and the background clearly shows how sharply the dark blue water, indicating the great depths of the sea, is separated from the lighter water over the shallow banks.

Cay Verde was reached on the "Physalia," a small yacht which the Marine Biological Laboratory of the Carnegie Institution placed at the disposal of the Museum for this occasion. The voyage was begun at Miami, Florida, on March 28, 1907, but unfavorable weather, including a severe storm, in which the "Physalia" narrowly escaped being wrecked, delayed the arrival at Cay Verde until April 8. The Cay has no fresh water and its only vertebrates are birds, one species of snake and two of lizards.

The Boobies, of which there were about 1500 pairs, nested only on the ground, making little or no nest. They were so tame that one could walk about among the sitting or brooding birds without causing them to leave their eggs or young. As a rule Boobies lay two eggs; but the second is apparently not laid for about a week after the first, and as a rule only one hatches.

The two or three hundred Man-o'-War Birds which lived on Cay Verde placed their nests in the dense growth of "sea-grape" and cactus which covered a portion of the Cay. They lay but one egg. The young acquire a covering of whitish down when a few days old, and this is quickly followed by a surprising development of the feathers of the back, which it will be observed more than cover the back before the corresponding feathers appear in the young Booby.

The male Man-o'-War Bird has the remarkable habit of inflating its red gular or throat-pouch until it resembles a toy balloon. The birds sit on their nests or even fly about displaying this surprising appendage.

With a wing expanse of between seven and eight feet and a body no larger than that of a hen, the Man-o'-War Bird is one of the most powerful and graceful of flyers. It feeds largely on flying-fish, which it catches in the air.



AMERICAN EGRETS IN CUTHBERT ROOKERY.
Study for the group from Nature.



CUTHBERT ROOKERY GROUP.
L. A. Fuertes making sketches for the background.

A FLORIDA ROOKERY

“**R**OOKERIES” are one of the characteristic features of the bird-life of Florida. The term is generally applied there to all gatherings of roosting or nesting birds, whether Pelicans, Cormorants or Ibises, but, because of their commercial importance, one more frequently hears of Heron rookeries. Before the demand for their plumage had brought the aigrette-bearing Herons and Roseate Spoonbill to the verge of extermination, a Florida rookery was one of the most remarkable sights in the bird-life of our country.

One may still find colonies of Ibises, Cormorants, Pelicans and plumeless Herons, but of those great gatherings of birds which were so abundant in the state twenty-five years ago, Cuthbert Rookery appears to be the only one remaining. Here alone will one find the birds just named and with them American and Snowy Egrets and Roseate Spoonbills. It seemed therefore especially desirable to make studies there on which to base a representation of this almost vanished phase of our bird-life.

As may be imagined, Cuthbert Rookery has continued to exist only because of its remoteness. It is situated in the heart of the great mangrove swamp which borders the Everglades at the extreme southern part of the state. So shallow is the water off this part of the Florida coast that the sharpie bearing the Museum expedition, although it drew only two and a half feet, could not approach nearer the shore than seven miles, and five hours were required to reach land by pushing and poling in small boats. In four hours more, following narrow passages through the dense mangroves, Cuthbert Lake was reached. The Rookery is on a small islet, about a mile from the entrance to the lake. At this time (March 29, 1908) it was estimated to contain about 35 Roseate Spoonbills, 15 Snowy Egrets, 350 American Egrets, 50 Little Blue Herons, 2000 Louisiana Herons, several hundred Ibises and a few Cormorants and Water Turkeys. Only the Spoonbills, Herons and Egrets were nesting.

The group is designed to show a portion of the rookery with the birds nesting and roosting in the mangroves, while the background portrays the whole islet at evening when the birds are returning.



A GOLDEN EAGLE'S NEST IN BATES'S HOLE, WYOMING.
Photograph from nature of the scene reproduced in the group.

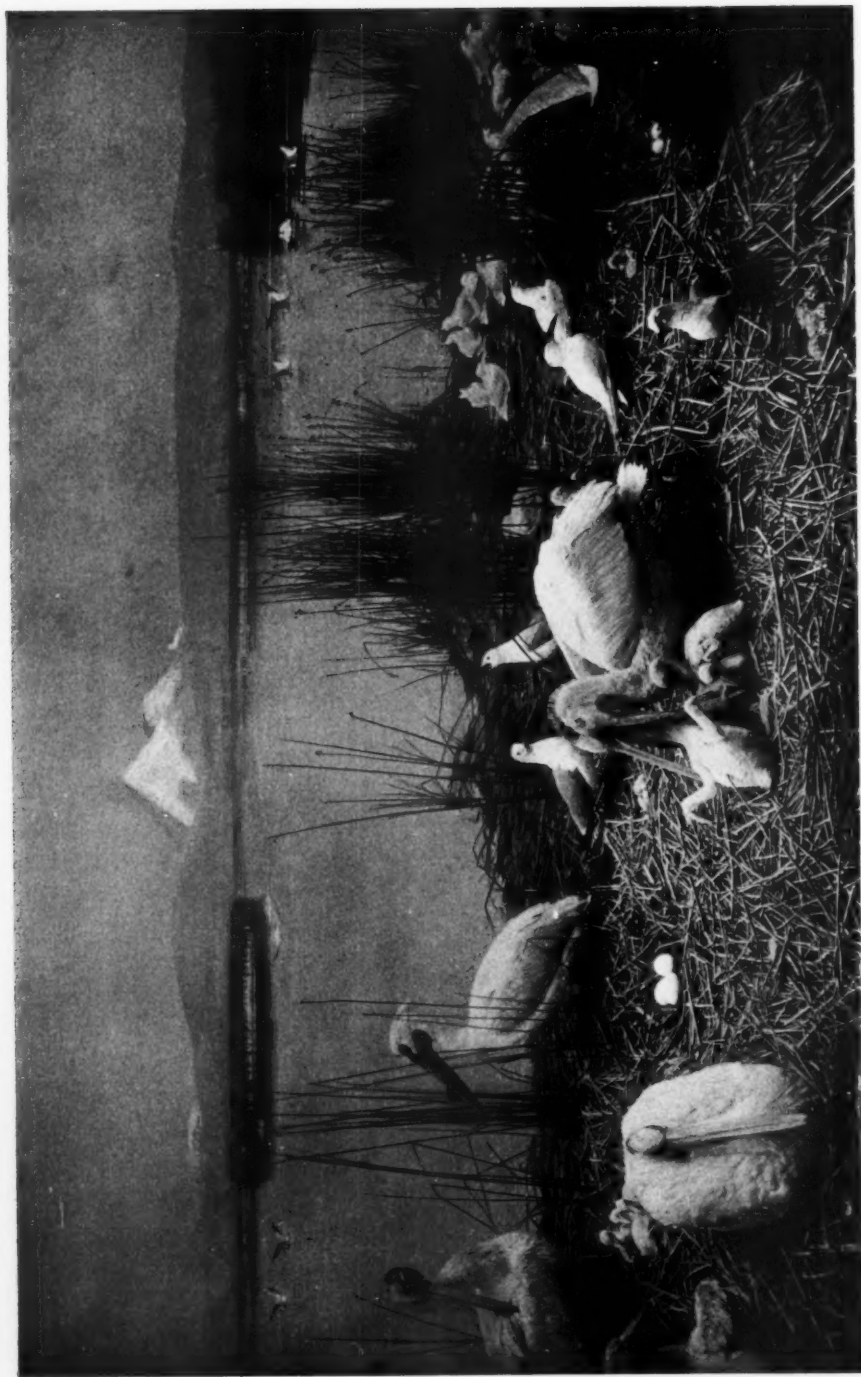
THE GOLDEN EAGLE IN WYOMING

THE Golden Eagle ranges throughout the mountainous parts of both the Old and the New World. In North America it is now very rare east of the Rocky Mountains, but from the Rockies west to the Pacific, and north to Alaska, it is not uncommon. In the mountains, the bird nests in cliffs, but in California it often builds in trees, white oaks being frequently chosen.

Although the Golden Eagle is powerful enough to prove a dangerous antagonist, it never attacks man, in spite of sensational stories to the contrary. Even when its nest is approached, the bird makes no attempt to protect its young, but either disappears entirely, or, calling, circles high in the air.

Eagles, like most raptorial birds, nest early in the year. They usually lay but two eggs, which hatch after thirty-five days' incubation. The young remain in the nest about two months. The natural food of the Golden Eagle in the west consists chiefly of small mammals of various kinds, such as prairie dogs, rabbits, squirrels, spermophiles and rats, together with ducks, geese and grouse. Occasionally it takes a young deer or antelope. On the whole, however, under natural conditions, the Golden Eagle is a beneficial bird because of the large number of rodents it destroys. But where sheep have been introduced, the Golden Eagle may become more or less injurious through its acquired habit of preying on lambs.

Four species of Eagles have been recorded from America north of Mexico. Of these the Gray Sea Eagle, an Old World species, is found in this hemisphere only in Alaska; and the Harpy Eagle, a tropical species, has been recorded but once, from Texas. This leaves virtually only two North American species, the Golden and the Bald Eagle. When the Bald Eagle is mature, with a white head and tail, the two species are very unlike in color, but before the Bald Eagle acquires its distinctive marks, it bears a general resemblance to the Golden Eagle. The latter, however, has the legs feathered to the toes, while in the former the lower part of the legs (tarsi) is bare.



A KLAMATH LAKE BIRD COLONY.
Background by Carlos Hittell. Birds by Herbert Lang.

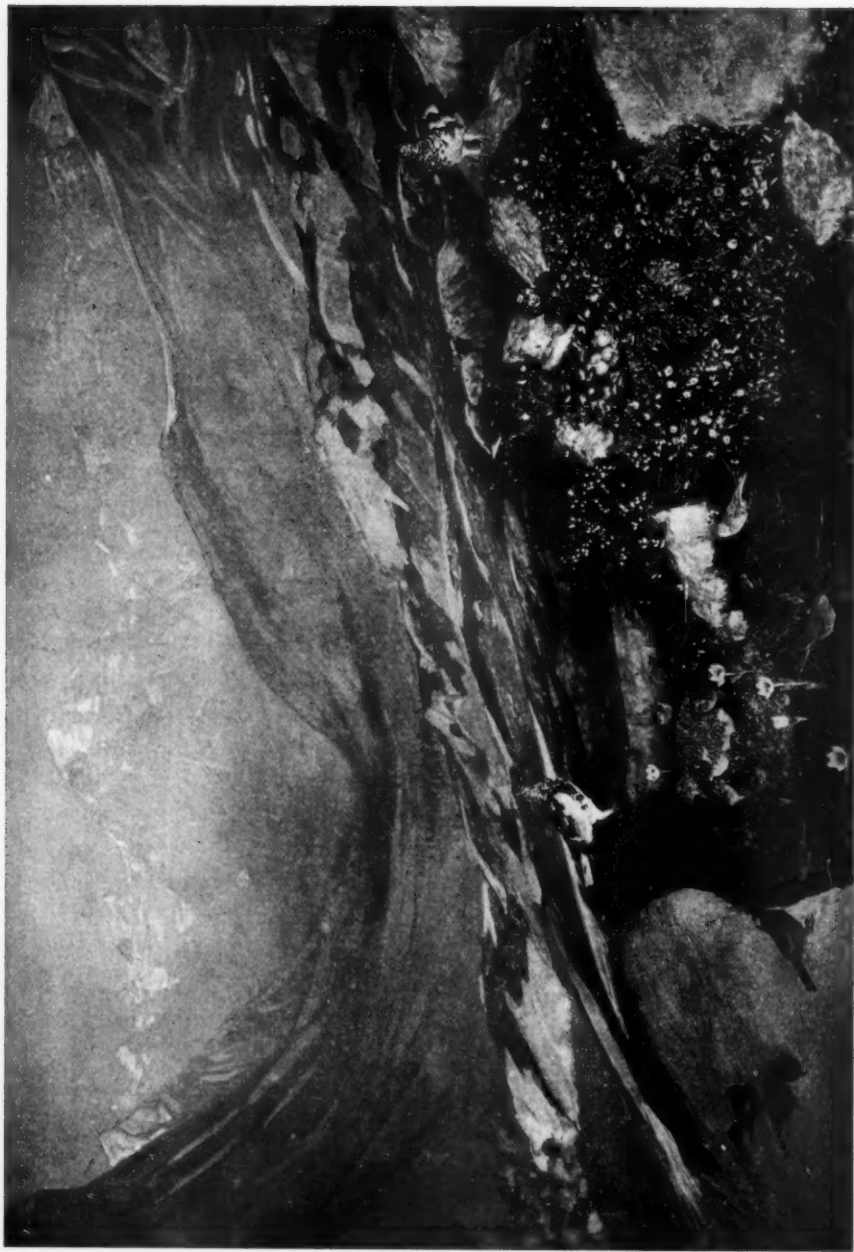
KLAMATH LAKE BIRD-LIFE

KLAMATH LAKE is situated in northeastern California on the Oregon boundary line. Its shallow water permits a great growth of tulés, or rushes, which almost completely fringe the shore, in places expanding to a width of several miles. They also form islands varying in size from a few square yards to many acres in extent. It is on these islands that the bird colonies are established. There is no soil or beach, and all the birds nest on the beds of matted tulés, usually at the border of the island. The White Pelicans, therefore, find here no pebbles with which to construct their usual mound-like nests; the Caspian Terns do without sand, and the Cormorants without rocks. Far more important than these is the protection which ground-nesting communal birds require, and this the islands supply.

Fifteen colonies of White Pelicans were counted in this locality between June 30 and July 7, 1906, and doubtless there were others, since only a part of the bird-inhabited region was examined. There were also great numbers of California and Ring-billed Gulls, Caspian Terns, and Farallone Cormorants, while Great Blue Herons, in default of trees, built platform nests of tulés among the growing tulés. White Pelicans feed while swimming, and were here devouring diseased fish which were floating in the water in large numbers, while Brown Pelicans capture their prey by diving; but the young of both species make their first attempts at fishing down the parental pouch, as a comparison of this group with the one of the Brown Pelican on the opposite side of the lake will show. The White Pelican weighs sixteen pounds, twice as much as the Brown Pelican. Its wing expanse is between eight and nine feet, and when in the air, it is one of the most impressive of birds.

Only one colony of the Caspian Tern, the largest, as it is one of the rarest members of its family, was observed. Unfortunately, this interesting bird community must give way to the demands of civilization, for a Government Reclamation project plans the draining of the lake and within a few years alfalfa will doubtless flourish where now tulés are growing.

The group represents the border of a tulé island, while the background shows other bird-inhabited islets, the surrounding treeless hills, and Mt. Shasta in the distance.



ARCTIC-ALPINE BIRD-LIFE IN THE CANADIAN ROCKIES.
Background by Carl Rungius from a sketch by L. A. Fournes.

ARCTIC-ALPINE BIRD-LIFE OF THE ROCKY MOUNTAINS

WHERE the summits of the Rocky Mountains, Sierras and Cascade Range reach above timber line to the limits of perpetual snow, the boreal nature of the climate produces conditions favorable for the existence of many plants and animals which in the Arctic Regions are found at sea-level. The altitude at which these conditions appear increases as the latitude decreases. For example, in Colorado, at latitude 40°, timber line is at 11,000 feet altitude, while in Alberta, Canada, at latitude 50°, timber line is at about 7,500 feet.

Where the area of sufficient altitude is practically continuous the presence of arctic forms of life may be due to extension of range southward; but where it is discontinuous, a boreal area may be separated from a similar region to the north by intervening lower ground, when the occurrence of boreal forms may be attributed to the influence of the Glacial Period. Forced southward during the Ice Age, they were left stranded on these high Arctic-Alpine islands as the ice receded.

The characteristic Arctic-Alpine birds of our western mountains are the White-tailed Ptarmigan; the Rosy Snow Finch (*Leucosticte*) and the Pipit. In the Rockies they are found as far south as Colorado or New Mexico. The Pipit migrates southward in winter, but the Ptarmigan and Snow Finch are practically permanent residents in winter descending only slightly below timber line. At this season, as is well known, the Ptarmigan acquires a pure white plumage. (For a seasonal group of Ptarmigan and an explanation of their plumage changes, see the Main Bird Hall).

The studies for this group were made in the Canadian Rockies about fifteen miles north of Laggan at the Ptarmigan Lakes. The party outfitted at Lake Louise, and ascended the mountains to the northward, from which one obtains a beautiful and impressive group of mountains in the Canadian Rockies. At the left, beyond Mt. Redoubt, in the foreground, lie the peaks of Moraine Lake; in the center is Mount Temple and to the right Hungabee, Lefroy and Victoria.

At this season (July 15, 1907) the alpine spring was at its height. The lakes were opening; great white anemones were blooming at the border of the snow fields; the heather was white with little bell-like flowers, and the beds of fluted *Dryas* leaves were starred with blossoms.



SAGE GROUSE IN WYOMING.
Background by Carlos Hittell. Birds by Herbert Lang.

THE SAGE GROUSE IN WYOMING

NEXT to the Wild Turkey the Sage Grouse is the largest of North American game birds. Its range is restricted to the high, sage-brush (*Artemisia tridentata*) plains of the West, from western Nebraska and western Dakota north to, and in places, slightly beyond the Canadian boundary, west to eastern Oregon and northeastern California, east of the Sierras, and south through Utah and Nevada.

Within these limits the Sage Grouse is resident, but it migrates locally at the approach of winter from higher to lower altitudes, as the snows deprive it of its food. This consists largely of the leaves of the sage-brush, but in summer the leaves and seeds of other plants are eaten. When feeding on sage-brush leaves, the flesh of the old birds is flavored by the nature of their food, but the birds of the year are very palatable.

The Sage Grouse begins to mate very early in the spring, or in some localities as soon as late February, and at this season the males indulge in the most remarkable performances; inflating the yellow sacs at either side of the neck, spreading the tail, dropping the wings and strutting like a turkey cock.

At times the bird varies this performance by plowing its breast along the ground, as it utters a "variety of chuckling, cackling or rumbling sounds." This habit is represented by one of the birds in the group, and is the cause of the abraded condition of the breast feathers of the cock Grouse.

The nest is a slight affair, usually placed beneath a sage-brush where it is often found by a marauding coyote. The hens hatch the eggs and raise the young unaided by the male, which, when its mate begins to sit, joins with others of its sex to form flocks composed only of males.

When the young are grown the sexes mingle in great bands which formerly contained thousands of birds. The birds drink night and morning at some regularly frequented spring, about which they sometimes gather so thickly that they must await their turn to reach the water.

The studies for this group were made at Medicine Bow, Wyoming, on the line of the Union Pacific Railway. The mountain to the right is Elk Mountain; those in the distance belong to the Snowy Range of Colorado.



THE LOVE-MAKING OF THE PRAIRIE CHICKEN.
Background by Bruce Horsfall. Birds by H. C. Denslow.

THE PRAIRIE HEN IN NEBRASKA

ON frosty spring mornings, as the sun rises over the prairies, one may at times hear a singular, resonant, booming note, *boom-ah-b-o-o-m, boom-ah-b-o-o-m*. It is the love-song of the Prairie Hen. He may be near at hand or possibly two miles away, so far does this sound, unobstructed by tree or hill, carry in the clear air. It is well worth following, however, for we may find the maker of it, with perhaps ten to fifty of his kind, engaged in a most remarkable performance.

During the mating season, from March until early in May, the Prairie Hens of a certain district or area gather before daybreak to take part in these courtship demonstrations. The feather-tufts on either side of the neck are erected like horns, the tail raised and spread, the wings drooped, when the bird first rushes forward a few steps, pauses, inflates its orange-like air-sacks, and, with a violent, jerking, muscular effort, produces the startling boom, which we may have heard when two miles distant.

At other times, with a low cackle, he springs suddenly into the air, as though quite unable to control himself, and, finally, he comes within striking distance of a rival who has been giving a similar exhibition. Then, with much clashing of wings, a fight ensues which often strews the nearby grass with feathers.

These tournaments of display and combat are doubtless designed to arouse the attention of the females, but they also occur when only males are present. Within an hour or two after sunrise, the time varying with the ardor of the birds, the competition is over for the day and the rivals feed peacefully together, until they enter the lists the following morning.

Market hunting has greatly decreased the numbers of Prairie Hens, but on the United States Government Forest Reservation, in the sparsely inhabited sand hills of western Nebraska, on the line of the Chicago, Burlington and Quincy R. R., where the studies for this group were made, they are still common.

The eastern Prairie Chicken, or Heath Hen, was once locally common from New Jersey to Massachusetts, but it is now found only on Martha's Vineyard.



GREBES (UPPER FIGURE) AND WILD GOOSE (LOWER FIGURE) ON CRANE LAKE,
SASKATCHEWAN.

Backgrounds by Hobart Nichols. Birds by Herbert Lang.

THE WILD GOOSE AND GREBE GROUPS

TWENTY years ago the lakes and sloughs of our more northern plains and prairies were the breeding homes of vast numbers of wild-fowl of many species, but the demands of agriculture have forced the birds to find new haunts north of the Canadian boundary. There, too, if proper protection is not accorded them, they will again be dispossessed by the advance of civilization.

Crane Lake, Saskatchewan, near the line of the Canadian Pacific, where the studies for both the Goose and Grebe groups were made, is typical of many similar resorts of wild-fowl in western Canada. In the vicinity of and about the border of sloughs and lakes there nest Willets, Marbled Godwits, Long-billed Curlew, Killdeer, Avocets, Wilson's Phalaropes, Spoonbill Ducks, Gadwalls, Mallards, Pintails and Blue-winged Teal; while among the reeds and tulés Western and Eared Grebes, Franklin's Gulls, Black Terns, Redhead and Canvas-back Ducks, Ruddy Ducks and Coots build their homes. The Geese resort to islands where also Ring-billed and California Gulls, Common Terns and Pelicans are found. Favorable islands are also selected by Ducks, and on the island shown at the right in the background of the Grebe Group, Messrs. Bent and Job estimated that on June 17, 1905, "at least 150 pairs of Ducks were breeding or preparing to breed."

The Wild Geese arrive from the south before the ice leaves the lakes and lay their eggs early in May. The young birds in the group were taken June 15, 1907, when they were about two weeks old. Grebes' nests are mere platforms of water-soaked vegetation. These eminently aquatic birds walk with difficulty and their homes must therefore be near the water. They leave the nest at the slightest alarm, but usually first cover their eggs with a part of the nesting material. One of the birds is shown in this act.

The young swim soon after birth and for a time are carried on the back of the parent.

The background in both groups shows the rolling, treeless plains with, in the Goose Group, a line of dune-like sandhills, where, among the low bushes, Sharp-tail Grouse are found.



CAMP ON CAY VERDE, BAHAMAS.

- No. 12.—THE COLLECTION OF FOSSIL VERTEBRATES. By W. D. MATTHEW, Ph. D., Associate Curator of Vertebrate Palaeontology. October, 1903. *Price, 10 cents.*
- No. 13.—A GENERAL GUIDE TO THE AMERICAN MUSEUM OF NATURAL HISTORY. January, 1904. *Out of print.*
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